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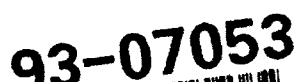

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Archeological Survey, Initial Site Testing, Geomorphology, and Pollen Analysis along the Lower Portion of Ditch 1, Poinsett County, Arkansas

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September 1987

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ABSTRACT

An archeological survey with initial site testing and geomorphic examinations of 17 miles along Ditch 1 in Poinsett County, Arkansas, was undertaken by Spears Professional Environmental and Archeological Research Service (SPEARS). The project was sponsored by the Corps of Engineers, Memphis District (Contract No. DACW66-87-C-0010). Combinations of survey strategies including pedestrian transects and screened shovel tests at 30 meter intervals were utilized depending upon the surface visibility. Four sites were discovered within the project right-of-way and one site was found just outside. Of these, three were subjected to initial site testing.

The Phillips Site (3PO493) is a historic twentieth century house site and prehistoric site. All artifacts were found only on the surface and in the upper disturbed plowzone level. Prehistoric ceramics and projectile points indicate an occupation or utilization of this area during the Early Woodland (Tchula phase), Late Woodland, and Mississippian periods. Site 2 is a redeposited site which was not assigned a state number. The landowner verified that in this location, soil was brought in to fill a depression. The Cooper Estate Site (3PO494) consists of a small area containing a few plain sherds which probably date to the Late Woodland and Early Mississippian periods. All the artifacts were confined to the surface and plowzone levels. Due to the low density of artifacts and the disturbed nature of the deposits, 3PO493, Site 2, and 3PO494 are not considered potentially eligible for nomination to the National Register and no further work is recommended. Site 4 was located entirely outside the project area and no subsurface tests were conducted.

The Ritter Pecan Grove Site (3PO495) is an Early Mississippian house site which may have been occupied repetitively. The site was discovered in a screened shovel test. Additional shovel tests at 10 meter intervals indicated that the site is small, measuring about 25 meters in diameter. A test unit disclosed intact cultural deposits beginning at 15 cm below the surface and extending to about 53 cm below the surface. Floral and faunal material were evident, and wood charcoal samples subjected to C-14 analysis dated the deposits at the top of the midden (15-25 cm bs) to 970 $\pm$ 170 B.P. and below (25-35 cm bs) to 900 $\pm$ 90 B.P. The Ritter Pecan Grove Site (3PO495) contains significant intact deposits which could be amenable to a host of research questions. The site is eligible for nomination to the National Register and is recommended for preservation.

Sediments taken from two deep cores and one archeological test unit were subjected to grain size analyses and C-14 dating in an effort to reconstruct the geomorphology of the area. Results

of the analyses from the archeological site indicated that the buried prehistoric occupation occurs on a natural levee probably associated with the St. Francis River or the Left Hand Chute of the Little River when it occupied the adjacent abandoned channel (Horseshoe Lake). There is a high probability that other archeological sites lie buried on natural levees in the meandering river region.

Sediments from the upper 4.75 m of Core 1, on the St. Francis River, indicate that this is a clay plug which lies on top of a natural levee. The top portion of the levee dates to 6,660 ± 170 B.P. These sediments may be associated with the Mississippi River when it occupied a more westerly location in the approximate location of the present Left Hand Chute of the Little River. Deposits below consist of crevasse channel sediments deposited during flood events when a meandering stream breached a natural levee.

Sediments in Core 2, which were located at the southern edge of the St. Francis Sunken Lands, consist of channel fill deposits in the upper portion of the core overlying the braided stream terrace. Charcoal from within the braided stream terrace dates to 31,250 ± 840 B.P.

Pollen was extracted from the two deep cores, one on the St. Francis River and the other from the St. Francis Sunken Lands. The vegetation along the St. Francis River was dominated by a mixed forest which has declined slowly but steadily over several thousands of years. The pollen recorded in the St. Francis Sunken Lands indicated a dramatic change in vegetation from the lower part of the pollen record to the upper portion. The lower part indicated a heavily wooded river valley where juniper/cypress dominated. The upper part indicates a reduction in juniper/cypress and birch, and increases in Isoetes microspores which are a result of river valley drowning. The pollen identified in this study are compared to recent pollen studies conducted on Big Lake and Pemiscot Bayou and are found to be similar. A Hypisthermal period is recognized in these studies.

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INTRODUCTION TO THE DITCH 1 PROJECT

The U. S. Army Corps of Engineers, Memphis District, contracted with Spears Professional Environmental and Archeological Research Service (SPEARS) for a "Cultural Resources Survey and Geomorphic Examination of the Ditch 1, Arkansas, Item 1, St. Francis Basin Project, Poinsett County, Arkansas" (Contract No. DACW66-87-C-0010). Proposed channel construction is located near the town of Marked Tree (Figure 1). The project begins at the junction of Ditch 1 and the St. Francis River and extends upstream about 8.44 miles to 200 feet upstream of the Highway 135 crossing. The survey area extended 200 feet, on both sides of the ditch, from the channel centerline. It also included an extra 200 feet of right-of-way for a bridge at mile 4.04.

The archeological survey and initial site testing were conducted by two field directors, one supervisor, and three crewmembers over a period of seven days between December 1 and December 8, 1986. The preliminary background research, including a records search at the Office of the State Archeologist and a review of Government Land Office surveys, was completed prior to the fieldwork. The management summary was submitted 10 days after completion of the fieldwork. The artifacts were washed in December, 1986; and analysis was conducted in January, 1987. The report was written over a period of three weeks in January, 1987; however, completion of the entire draft manuscript was delayed due to the lengthly processing and writing time required by the palynologist and geomorphologist.

Research Emphasis

Prior to the fieldwork, a predictive model for archeological site location based primarily on soil types, which are indicators of landscape origin and topography, was developed for the project. Using density estimates derived from other archeological surveys in the vicinity, it was predicted that 4 sites would be found in the project. The survey resulted in recording 5 new sites, one of which was outside the project area. All of the soils in the project area were of low or medium site density potential. Soils with low potential are clays associated with backswamps, and soils with medium potential for sites are soils which formed on the slopes of the terraces or levees. During the survey, it was apparent that the contact of medium probability soils with low probability soils was the best predictor of site location. These contacts represent the old terraces or natural levees adjacent to channels.

The geomorphic study was undertaken in order to examine the potential for deeply buried sites within the project area and to

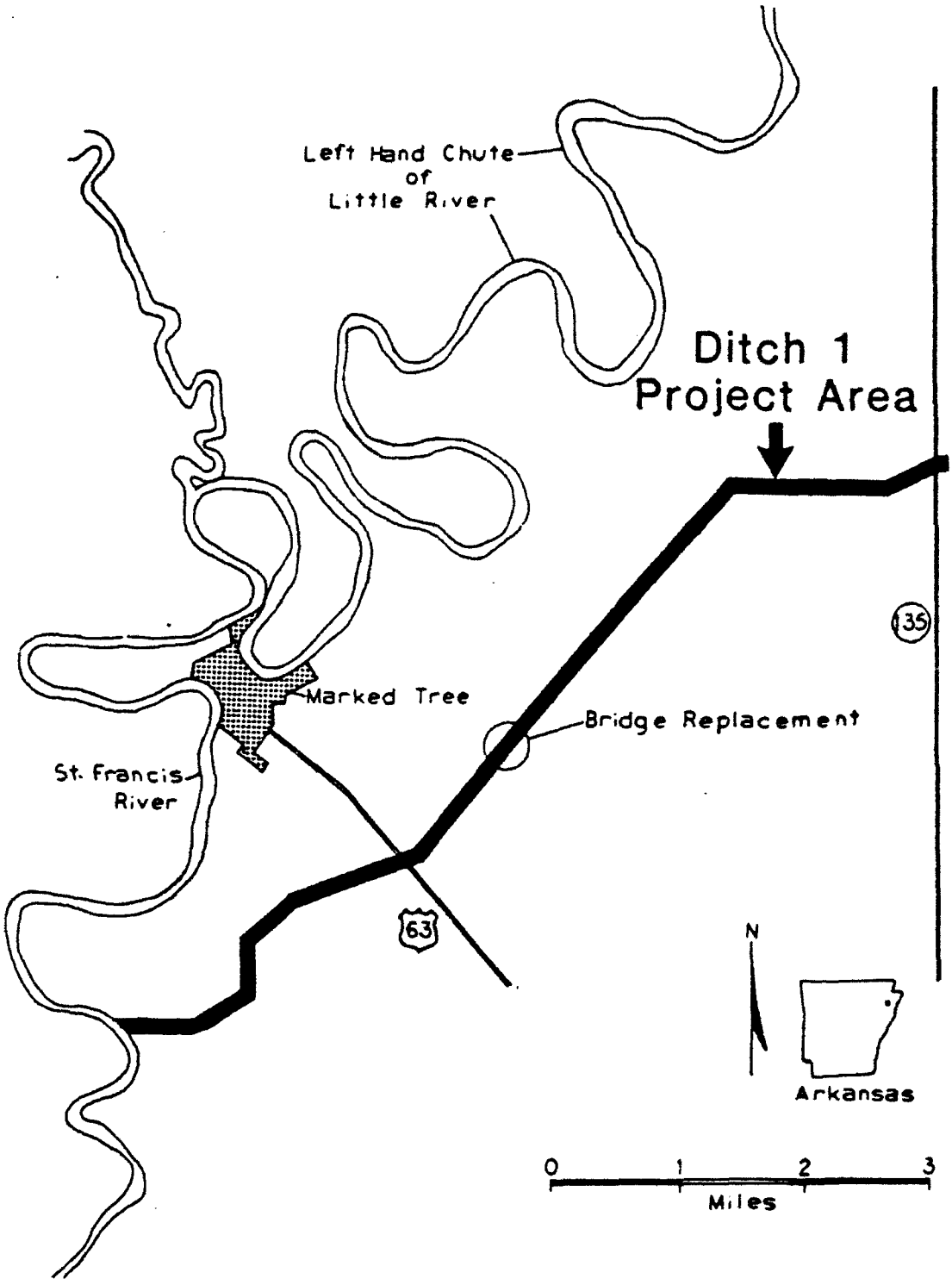


Figure 1. Location of the Ditch 1 Project Area.

collect information on the age and nature of sediments. The contract allowed for palynological columns in order to obtain data useful in the interpretation of the paleoenvironment. Geomorphic fieldwork included the collection of sediment samples at two of the archeological sites and deep core borings in the St. Francis Sunken Lands and Horseshoe Lake located near the confluence of Ditch 1 and the St. Francis River. Sediments in the deep cores were analyzed for pollen, radiocarbon dating, and sediment textures. Field observations made during shovel tests on transects indicated that the upper sediments (0-50 cm below the surface) within the Ditch 1 project area are fine textured, backswamp and channel fill deposits, with a few sand blows overlying these clayey sediments in the northern portion of the project area.

Fieldwork Conditions

Visibility during the archeological survey was good to excellent (50 to 100%). Most crops had been harvested and fields had been disked and rained on. Visibility was slightly reduced in fields of young winter wheat and in soybeans that had not been harvested. Areas with sufficient visibility were systematically walked at intervals of less than 30 meters. Along the ditch spoil, visibility was obscured by weeds, grass, and trees. Shovel tests were excavated along 2.5 miles of Ditch 1 where visibility was less than 10 per cent. These shovel tests on transects were excavated in two nearly parallel rows at 30 meter intervals or less. Tests were a minimum of 30 x 30 cm in diameter and at least 50 cm deep.

Some constraints other than visibility were encountered during the survey. Saturated clays made walking the transects slow and tiring, and the shovel tests could not be screened. Fill from shovel tests was shoveled into screens and carefully troweled. The wet clays also made field roads impassable and slowed access to some portions of Ditch 1. One test unit was completed during a rain on the last day of the fieldwork.

Results

Five sites (3PO493, Site 2, 3PO494, Site 4, and 3PO495) were found during the archeological survey, and initial site testing was conducted at three of these sites. One of the five, Site 2, was determined through field observations and a landowner interview to be a redeposited site. An isolated find of one sherd, Site 4, was collected outside the project area. No subsurface examinations were conducted at these latter two sites and no permanent state site number was assigned. A few historic artifact scatters were found; but, with the exception of the historic component at The Phillips Site (3PO493), all appeared to be recent to mid-twentieth century.

The Phillips Site (3PO493)

At The Phillips Site (3PO493), located on the edge of a depression once known as Swan Lake, clay tempered and shell tempered ceramics and lithic artifacts were observed during the initial survey, along with a substantial scatter of historic artifacts. Artifacts were collected from controlled surface collections, shovel tests, and two 1 m x 1 m test units. These investigations indicated that one historic and at least two prehistoric components present at the site are restricted to the modern plowzone. No undisturbed or intact deposits were discovered, and the highest surface artifact densities were on the eroded slopes of the low terrace on which the site is located. Lithics at 3PO493 are similar to those at the nearby McCarty Site (3PO467), primarily an Early Woodland, Tchula phase site. The total artifact assemblage indicates utilization during the Early Woodland, Late Woodland, and Mississippian periods.

Due to the shallow, disturbed deposits, the low density of artifacts on the surface, and the mixture of three components, The Phillips Site (3PO493, has little research value and is in our opinion not eligible for nomination to the National Register. In connection with the proposed project, no further work is recommended.

Site 2

Site 2 consists of one sherd found in spoil used to construct an airstrip. Because it is a redeposited artifact, it has not been assigned a permanent state site number. The landowner leveled the Ditch 1 spoil to about one foot above the original ground surface. He then added 3 to 4 inches of sand from a spoil bank west of the St. Francis Floodway near Payneway. The isolated sherd was found on the airstrip, and could have been transported some distance during the construction and grading of the airstrip. No artifacts were found on the original ground surface or in an examination of the sides of the ditch nearby. Site 2 is not eligible for nomination to the National Register and no further work is recommended.

The Cooper Estate Site (3PO494)

The Cooper Estate Site (3PO494), located near the confluence of Ditch 1 and the St. Francis River, was recognized by a thin scatter of ceramics on the surface. Because the density was low, each sherd was individually collected and mapped with a transit and stadia. Only 12 sherds were found in the disked cotton field with about 100% surface visibility. Six shovel tests and one 1 m x 1 m test unit were excavated. One sherd was found in the plowzone in one shovel test, one sherd was found in the plowzone of the test unit, and all other tests were culturally sterile. No lithic artifacts were found. The test unit was oriented around an irregular feature containing an organic soil and fired clay, which was interpreted after excavation to be a root cast. All of the fill from this feature was collected and water

screened at a later date. Six small irregular fragments of burned clay were the only artifacts recovered by water screening. No artifacts were collected below the modern plowzone. Due to the low density of material and the lack of intact deposits, 3PO494 is not eligible for nomination to the National Register and no further work is recommended.

Site 4

Site 4 was a single, small, grog and shell tempered sherd found outside the project area and was not assigned a permanent state site number. This sherd was found about 400 meters south of Ditch 1 in a field with almost 100 per cent visibility. No other artifacts were observed, and since the site lay outside the project boundary, no subsurface tests were conducted and the site has not been evaluated for National Register significance.

The Ritter Pecan Grove (3PO495)

The Ritter Pecan Grove Site (3PO495) is located adjacent to a depression once known as Horseshoe Lake, a plugged, cut-off oxbow of the St. Francis River. This site was recognized by the presence of an organic soil (midden), fired clay, and a shell tempered sherd in a shovel test. Surface visibility was near zero due to a heavy ground cover of bermuda grass, and no artifacts were observed on the surface. Five shovel tests and one 1 m x 1 m test unit were excavated at the site. The test unit and positive shovel tests indicated that the site is buried beneath about 15 cm of sterile overburden. The site consists of an organically rich midden about 30 cm thick, located on the edge of a terrace on the inside bend of the old Horseshoe Lake. Shovel tests which were used to define site size indicated that it is less than 30 meters in diameter. 3PO495 may represent a single component Mississippian house site. The thickness of the midden indicates intensive occupation. No features were recognized in the shovel tests or the test unit, and most of the artifacts were plain, shell tempered body sherds. Wood charcoal sufficient for C-14 dating was collected, along with other charcoal tentatively identified as nut shells. Three C-14 samples produced uncorrected dates of 970 $\pm$ 170 B.P., 900 $\pm$ 90 B.P., and 520 $\pm$ 70 B.P. It is SPEARS opinion that the contents of the Ritter Pecan Grove Site (3PO495) are important to our understanding of the prehistory of the area and the site is eligible for nomination to the National Register.

Geomorphology and Pollen Results

A geomorphic study was conducted in the Ditch 1 study area which is located near the juncture of the braided stream terrace and the meandering stream level. Sediments from two cores (about 7 meters in depth) and one archeological test unit were subjected to grain size analyses. Charcoal was collected for C-14 dating, and pollen was analyzed from the core samples. Core 1 and Site 5 were located on an old meander or oxbow of the

Left Hand Chute of the Little River. Core 2 was positioned at the southern end of the St. Francis Sunken Lands.

The oldest landform identified in this study was the braided stream terrace. It was found in the lower part of Core 2. Charcoal collected from sediments aproximately 3 m (10 ft) into the braided terrace dated these deposits to 31,250 ± 840 B.P. Pollen identified in this landform indicated a high frequency of not only juniper/cypress; but also, an abundance of hickory, hackberry, blackgum or tupulogum, Salix, Ulmus, and only small quantities of spruce. Above the braided terrace were channel fill deposits containing pollen which reflected a change in vegetation due to valley drowning. The juniper/cypress frequencies decrease while the pine and oak were not as affected by the change in environment. More weedy herbaceous plants and Isoetes microspores (quillwort) increase dramatically as a result of inundation.

The next oldest deposits are the crevasse channel sediments which were observed in the base of Core 1. Crevasse channel are sediments deposited during flood episodes when a meandering stream breaches a natural levee. No date was obtained for these deposits. Pollen found in these sediments indicated that a dense hardwood forest grew along this river region. There is a decline in arboreal pollen and an increase in various nonarboreal pollen prior to 6,660 ± 170 B.P. when the lowland forest thinned slightly. There is no evidence of a dramatic climatic shift during this period.

Above the crevasse channel deposits are natural levee deposits. A date of 6,660 ± 170 B.P. was obtained toward the top of these deposits in Core 1. These sediments may be associated with the Mississippi River when it occupied a more westerly location in the vicinity of the Left Hand Chute of the Little River. Also, Site 5, which is situated on the top of the natural levee, was radiocarbon dated to around 900-1,000 B.P. This was about the same time which Saucier (1970) suggests the Left Hand Chute of the Little River developed. Above the natural levees in Core 1 was a clay plug which developed under slackwater conditions. These deposits are associated with the most recent landform identified in the study area.

The results of the pollen analysis were compared to recent studies conducted in Pemiscot Bayou and Big Lake. Several similarites were found. River valley drowning in the upper section of cores from the St. Francis Sunken Lands, Big Lake, and Pemiscot Bayou showed similar wet and marshy habitats. Increases in oak and pine during the middle Holocene indicated a slight warming and drying trend. As discussed later in this report, drier conditions were recorded in Southeast Missouri between 8,700 and 5,000 B.P. and between 6,500 and 3,500 B.P. at Big Lake and Pemiscot Bayou. This drier period predated 6,660 B.P. in the vicinity of the Ditch 1 project area.

One archeological implication of the geomorphic study is that buried sites are likely to occur in the meander belt. The most probable landform to contain prehistoric sites is the natural levees which post date the braided terrace. Deposition in this setting was discontinuous or episodic with periods when flooding did not occur and occupation was possible. In addition, the shallow clay plugs or oxbows which date to the recent historic periods may be burying natural levee deposits which were occupied prehistorically.

PREVIOUS RESEARCH IN THE VICINITY

No previously recorded sites were on record with the Office of State Archeologist in the immediate project area. One archeological contract conducted by Keller et al. (1983) included all of Ditch 1; however, the sampling design for the archeological survey portion involved a survey of 15% of the total ditch length. This sample did not include an investigation of any lands within the present Ditch 1 project. Also, the survey did not locate a sufficient quantity of sites to be able to derive a statistical predictive model. General predictive statements based on geomorphic interpretations were made for all of Ditch 1. The prediction for the area investigated in this study, which includes a little less than the first 10 miles of Ditch 1 from its confluence with the present St. Francis River, was stated as follows (Keller et al. 1983:82):

> As a general rule, this segment is not expected to display high site densities. This statement is made in view of the general environmental situation and current degree of disturbance. An exception does exist at 3PO475 where the ditch incorporates an old meander scar. As a result, old stream courses within the proposed impact corridor may deserve additional attention.

Sites in the vicinity of the proposed project include Walnut Mound (3PO37) which covers about 150 square meters as recorded in the mid-1960s by amateur archeologists. They found ceramics which appeared to be Woodland. This site is situated about one-half mile south of Ditch 1. East of Walnut Mound is the main channel of the Tyronza River, an area which was intensively occupied. On the north side of Ditch 1 is 3PO319 which is a small knoll containing evidence of a Mississippian occupation. The St. Francis River and the Left Hand Chute of the Little River run both north and west of the project and several important archeological sites, including large villages and ceremonial centers such as the Hazel Site (3PO6), have been investigated. One of the more important sites investigated is the McCarty Site (3PO467) which is situated toward the north end of the project area about one-half mile from the south side of Ditch 1. This site was the location of salvage excavations conducted by Dr. Dan F. Morse in 1981 (Morse 1982a) prior to landleveling. Also, limited testing at the Sunday Site (3PO475), which lies to the north of the project area, was conducted by New World Research (Keller et al. 1983). This site was found to be significant and eligible for nomination to the National Register.

The McCarty site covers a total of 2500 square meters and lies adjacent to the relict backswamp between the Tyronza River and the Left Hand Chute of the Little River (Morse and Morse 1983). The sediments at the McCarty site were clayey but not as plastic as the other backswamp soils which lie adjacent to the site.

During salvage excavations, a total of 29 features were exposed and excavated. Nine of these dated to the transitional period from the Early to the Middle Mississippian period (A.D. 1000-1050). Twenty features, including 7 storage pits, 10 burials, 1 earth oven, and 1 mussel shell anomoly were affiliated with the Tchula Period. It is from the cultural material within these features that the Tchula phase in Northeast Arkansas has been defined and shown to be a "rich and sophisticated" culture (Morse 1982a:1). The assemblage included copper beads, stone beads, a stone gorget, a hematite plummet, a green stone celt, small chert adzes believed to be woodworking tools, a basalt adz, bone points, a predominance of Weems projectile points, 2 McCarty points, Rice side notched points, bulbous based and other side notched points, Gary points, and a drill. Ceramics consisted of biconical clay objects, an abundance of sandy paste ceramics, a Cormorant Cord Impressed bowl, and other decorated ceramics including podal supports and tetrapods. The McCarty site shows that the lowland meander belt environments were occupied during the Tchula phase and even later.

Another site with a Tchula phase component (3PO492) was recently discovered in the St. Francis Floodway about 8 miles west-southwest from this project area (Taylor and Spears 1986). A 1 m x 1 m test unit disclosed an intact buried cultural horizon which begins under a 15 cm level of spoil (plowzone) from previous ditch construction followed by 10 cm of a sterile cap probably deposited under slackwater conditions. The intact cultural midden began about 25 cm below the surface and extended to about 50 cm. The distribution of ceramics in the intact cultural level consisted of clay tempered and sand tempered sherds with a higher percentage of the latter. Several sherds with a combination of these tempers and two Weems projectile points were also collected at the site. The discovery of this buried site further supports the thesis that Woodland sites are buried in alluvial deposits characteristic of swamplands.

The Sunday Site (3PO475) is located on the crest of a terrace adjacent to an old meander of the Tyronza River known as Spear Lake. It was one of the few sites found during the initial Ditch 1 survey (Keller et al. 1983). Almost 200 hundred artifacts were collected on the surface of the site, which measures 200 m x 110 m. One test unit was excavated. Soils in this unit were interpreted as a 20 cm plowed (disturbed) midden which dated to the Late Woodland and Early Mississippian period. The Sunday Site was recommended for further work (Keller et al. 1983).

About forty archeological projects have been conducted in Poinsett County and are listed in the files of The Office of State Archeologist. These include: early surveys of Mounds by Thomas in 1881 and eastern Arkansas by Dellinger in 1932; investigations at single sites such as Brand, Floodway Mounds, Hazel, Lace Place, Miller Mounds, Wimpsey Site, the Rivervale Site, the McCarty Site, and 3PO492; projects within the towns or small communities of Trumann and Payneway; in-house Corps of Engineers projects on

the St. Francis Lake and in a permit area; watershed projects for the county; basin projects on the Tyronza River, St. Francis River, Cache River, and Ditch 81; and the survey and testing along a corridor from Keo to Dell. In addition, the best comprehensive overview of the region is provided in Archaeology of the Central Mississippi Valley by Morse and Morse (1983). Also numerous data on the St. Francis River Basin have been compiled by Dekin et al. (1978), and Keller et al. (1983).

The General Land Office Survey (GLO) and old highway maps were examined prior to the fieldwork, and several interesting natural and historic features were observed in the vicinity of the project. On the GLO map of November 20, 1923, a lake called Swan Lake is evident. At the southern end of this lake and on the meander line of 1847 is a structure labeled as belonging to Dan Smith. On the eastern end of the lake is the Joseph D. Phillips residence. Toward the center of the lake is Drainage Canal No. 9, which was probably dug to drain the shallow lake and lowlands. After drainage, the land was cleared and became suitable for cultivation and habitation. The area has remained under cultivation since that time.

South of Swan lake on the 1923 map is Horseshoe Lake, which is an old meander scar of the St. Francis River. This area has also been drained by ditches, and the land now inside the meander loop is a large, fairly old pecan grove. On the northern end of the project is another meander channel known as Spear Lake. It is in this vicinity that several sites including the Sunday Site are situated. Historic cultural features observed in the project are several railroad crossings of the St. Louis and San Francisco lines, tenant houses, and one Church of God.

Many of the previous studies in the vicinity and in the county are important to this research and have been useful to understanding the archeology of the area and providing information used to evaluate the significance of the sites located within the project area. The present project research emphasis is to gather information relative to understanding paleoenvironments, the geomorphology of the landscape, its prehistoric use, and the potential for buried sites. One value of these types of studies is to be able to predict the location, condition, and types of sites situated within an area which has historically and prehistorically changed a great deal. The information gained from each study increases our knowlege of the data base and ultimately will be useful to define and develop predictive statements about the cultural resources of the region.

CULTURAL HISTORY

Paleo-Indian Period (9,500-8,500 B.C.)

Although people have lived in the St. Francis Basin since about 9,000 B.C., evidence of the earliest habitation (known as the Paleo-Indian period) is rare, consisting only of isolated finds of distinctive, fluted projectile points. These projectile points are assigned to the Crowley's Ridge phase and Sedgwick phase, each phase representing a particular distinctive point style (Morse and Morse 1983:61). No intact sites have been discovered, and there are no direct indicators of Paleo-Indian lifeways. Based on ethnographic studies of primitive societies and paleoenvironmental reconstructions, small band level societies probably depended for subsistence on a combination of hunting and fishing and collecting edible wild plants. Some intact sites of this time period (9,500 to 8,500 B.C.) may be preserved on late Pleistocene braided stream terraces buried by subsequent alluvium.

Archaic Period (8,500-500 B.C.)

The next oldest prehistoric cultural period recognized in the St. Francis basin is the Dalton, or Early Archaic, period. Again, distinctive projectile points are the markers for this cultural horizon, although known sites have produced an extensive stone tool assemblage. Direct data on non-lithic tools, floral and faunal resources, and social organization are lacking, although a sophisticated band level organization utilizing high biomass game animals, fish, and wild plants is postulated. The Dalton period in northeast Arkansas is known as the L'Anguille phase, and in southeast Missouri as the Bloomfield Ridge phase, and dates from about 8,500 to 7,900 B.C. (Morse and Morse 1983:71).

Several other projectile point types found in northeast Arkansas have been assigned to the Early Archaic period. These types post-date the Dalton period, and Morse and Morse (1983:99-113) interpret their appearance as evidence of adaptation to a warm, dry climate beginning about 7,000 B.C. This period of warm, dry climatic conditions, known as the Hypsithermal, lasted from about 7,000 to 3,000 B.C. (Morse and Morse 1983:99). During this time, human occupation of the St. Francis basin probably became less intense, and in the period known as the Middle Archaic, the basin may have been seasonally used by populations residing outside the area.

The return of a cooler, wetter climate about 3,000 B.C. corresponds to the beginning of the Late Archaic, or Poverty Point, cultural period, which lasted until about 500 B.C. (Morse and Morse 1983:115). This period is characterized by a variety

of projectile point types and ground and polished stone artifacts, including atlatl weights, axes, beads, and tubular pipes. There are also indicators of widespread trade networks represented by artifacts such as marine shells from the Gulf coast and novaculite from southwest Arkansas. One of the horizon markers for the Late Archaic period is the presence of fired clay balls known as Poverty Point objects. These presumably functioned as heating elements in earth ovens. Clay balls are infrequently found in the St. Francis basin; but sandstone and chert can also be used in earth ovens, and fire cracked rock is common on many Late Archaic sites. Late Archaic trade networks and the numerous sites attributable to the period suggest an increase in population from the preceding periods, and these populations were probably organized at a tribal level, more complex than the earlier band level societies (Morse and Morse 1983:132).

Woodland Period (500 B.C.-A.D. 700)

The Woodland period of prehistoric cultural development is identified in the St. Francis Basin by the presence of pottery vessels tempered with clay or sand. The Early Woodland period, dating from 500 B.C. to 0, and also called the Tchula period, is represented by non-ceramic artifacts similar to the artifacts of the preceding Late Archaic period. The addition of pottery to the tool assemblage indicates a new cooking technology, and the presence of cultivated plants in the Tchula period indicates a more sedentary settlement system than in earlier periods. However, the Late Archaic earth oven method of cooking was still used along with the Woodland cooking pots; and the cultigens found on Tchula period sites developed during the Late Archaic also. The noticeable correlation of agriculture, pottery, and burial mounds suggests increased social and ceremonial organization during the Woodland period. The Tchula period is represented in the present project vicinity by one excavated site, the McCarty site (Morse 1982a), which has been assigned to the Pascola phase (Morse and Morse 1983:145-159) and by one recently tested site assigned to the Tchula period on the basis of its similarity to the McCarty Site (Taylor and Spears 1986).

The Middle Woodland period, known as the Marksville period in the central Mississippi valley and the St. Francis Basin, dates from 0 to A.D. 400. This period is represented just south of the present project by the Helena phase, named after a complex of burial mounds at Helena, Arkansas, near the mouth of the St. Francis River. The phase boundaries extend up the St. Francis to near Parkin, Arkansas, but no sites are reported in the present project vicinity (Morse and Morse 1983:172-175). Known sites of the Helena phase contain the exotic artifacts typical of the Middle Woodland period, representing trade networks extending from the Gulf coast to Canada and as far west as the Rocky Mountains. Grog tempered pottery, decorated by incising, punctating, red filming, and stamping, is characteristic of the Marksville period.

The Late Woodland period in the project vicinity dates from A.D. 400 to 700. The present project is on the northern boundary of the Baytown phase, identified by grog tempered ceramics decorated primarily by cordmarking. Just to the north of the present project vicinity most Late Woodland sites contain sand tempered pottery characteristic of the Dunklin phase. The two types of tempering may represent social groups organized into two separate tribes each possessing a different settlement pattern and social organization (Morse and Morse 1983:180-199). There seems to be an increase in population during the Late Woodland period. This population is widely distributed throughout the lowlands of the St. Francis Basin on small sites that probably reflect the seasonal exploitation of specific, varied environments.

Mississippian Period (A.D. 700-1540)

About A.D. 700, the grog tempered and sand tempered ceramics of the Woodland period were replaced by shell tempered pottery. This technological innovation, along with the introduction of the bow and arrow, signaled the beginning of the Mississippian cultural period. Early Mississippian populations were commonly distributed very much like the Late Woodland populations of the Baytown phase, in varied environmental zones. Archeological indicators of social organization suggest the development of incipient chiefdoms in the Early Mississippian period, with well organized villages and distribution systems. By A.D. 1000, these villages were becoming stratified politically, and were oriented around prominent civic-ceremonial centers with mounds. These mound centers served individual, independent chiefdoms recognized archeologically by significant variation in the decorated ceramics. All of these chiefdoms participated in broad exchange networks and a common ceremonial complex represented by shell ornaments, embossed copper plates, exotic lithics, and human figurines. The Middle Mississippian period, which dates from A.D. 1000 to 1350, is represented in the present project area by the Cherry Valley phase (Morse and Morse 1983:241-246). By A.D. 1350, the populations in the St. Francis Basin had become nucleated in large, fortified villages. These large villages indicate increasing levels of conflict among complex, powerful chiefdoms, and are the primary characteristic used to define the Late Mississippian period. One marker for this period is a distinctive arrow point which may have been developed specifically for warfare (Morse and Morse 1983:271). These chiefdoms continued to develop until their populations were decimated by diseases introduced with the earliest European explorers, and by A.D. 1673 only the Quapaw remained in any numbers in the central Mississippi valley (Morse and Morse 1983:300-301).

Proto-Historic Period

The earliest of the European explorers was De Soto, with his expedition of 1541. Morse and Morse (1983:305-315) have summarized a probable route of the expedition that would have

taken the explorers up the St. Francis River, passing very near the present project locality. Sixteenth century European artifacts have been found at the Parkin site a few miles downstream from the present project (Klinger 1977). The area was probably not again visited by Europeans until the Marquette expedition of 1673. By 1828, the native populations had been removed by treaty from Arkansas to the Indian Territory.

Historic Period

Soon after the removal of the native populations, the St. Francis Basin became sparsely settled by subsistence farmers who probably derived a large part of their food and some income from hunting. Because of the swampy conditions in the area, much land was undeveloped and remained available for homesteading through the first third of the twentieth century. Timber harvesting was a major economic enterprise during this period, and was followed closely by farmsteads. These farm populations have followed the pattern set by their prehistoric predecessors in becoming increasingly nucleated and more dependent on broad exchange networks.

PHYSICAL GEOGRAPHIC CHARACTERICS OF THE STUDY AREA

by

John C. Dixon

Regional Geomorphology

Ditch 1 is located in the Eastern Lowlands physiographic province of the Mississippi Alluvial Plain (Figure 2). The lowlands lie to the east of Crowley's Ridge and are characterized by a topography ranging from broad flat terraces to alternating swales and low ridges. The lowlands are developed on alluvial sediments of the ancestral Ohio and Mississippi Rivers. The geomorphic evolution of the region is discussed in detail later in this report.

Within the Eastern Lowlands a variety of depositional environments exist. These include braided stream terraces, meander belts, and backswamps.

The western portion of the Eastern Lowlands is occupied by braided stream deposits. The terrace sediments were derived from glacial outwash transported by the Mississippi, Missouri, and Ohio Rivers. The sediment is comprised of coarse to medium sand and gravel which extends as much as 200 feet below the terrace surface. The terraces are characterized by broad flat to gently rolling stream surface with sinuous, flat-bottomed relict braided stream channels. The braided stream channels are commonly infilled with fine grained silt and clay-rich sediments which may be as much as 15 or more feet thick. These channel fills are much younger than the terrace deposits and represent fluvial deposition during the Holocene (Saucier 1974). The lower terraces in the St. Francis Basin, however, lack mappable braided stream channels. Saucier (1974) suggests that this is due to blanketing by backswamp deposits.

To the south and east of the braided stream terraces are the younger, Holocene, Mississippi Valley Alluvium, including associated abandoned meander belts. The meander belts consist of a diversity of fluvial landforms and associated deposits. Point bars which are characterized by the presence of parallel, arcuate ridges and swales developed in laterally accreted sands and gravels are the dominant landform of the meander belts (Saucier 1974).

Within the meander belts are numerous abandoned channels in various stages of infilling. Completely infilled, abandoned

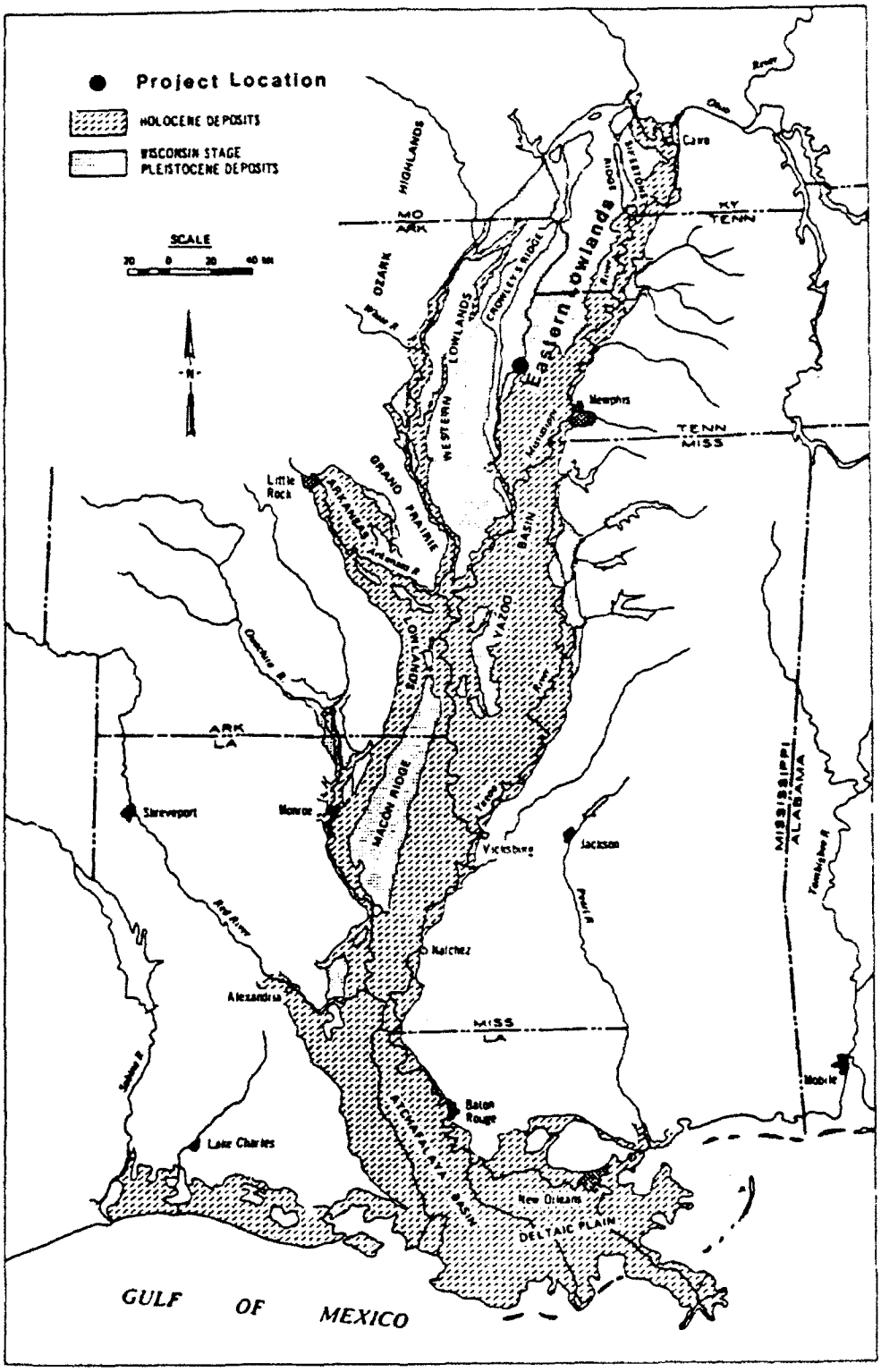


Figure 2. Physiographic Provinces of the Mississippi Alluvial Plain (Base map from Saucier 1981:Figure 1).

channels are referred to as clay plugs and consist of thick deposits of silt and clay which may reach thicknesses of as much as 100 feet. Adjacent to the abandoned channels, as well as the modern channels, are natural levees and their associated deposits. Natural levee deposits are silty and sandy clays which overlie lateral and vertical accretion deposits. The natural levees are characterized by smooth to undulating topography that slope from the margins of their parent streams at angles of less than 5 feet per mile. The natural levees commonly constitute the greatest relief in the meander belt (Saucier 1974).

Marginal to the meander belts are the backswamp areas. The backswamps represent areas of continuous, or nearly continuous aggradation associated with the deposition of silts and clays carried into the area by stream floodwaters. Depositional environments vary from infrequently flooded bottomlands to permanently lake-filled swamps. The backswamps occupy the topographically lowest parts of the floodplains (Saucier 1974).

The area is drained by three major rivers: the Left Hand Chute of Little River, the St. Francis River, and the Tyronza River. Within the project area, the St. Francis River flows through an area referred to as the St. Francis Sunken Lands (Fuller 1912) which in their entirety consist of three major subdivisions: Lake St. Francis, Hutchie Coon Sunk Lands, and Big Lake.

Climate

The study area is located within the humid subtropical (Cfa) climatic region of the Koppen climate classification system. Summers are hot and humid, while the winters are mild. Average annual temperature is 64 degrees Fahrenheit, with mean January temperature of 38.9 degrees and a mean monthly high of 90.9 in July (Gray and Ferguson 1977).

Precipitation is fairly evenly distributed throughout the year, with slightly greater amounts falling in the spring and the fall. Average annual precipitation is 49 inches. Most of the precipitation falls as rain associated with thunderstorm activity in the summer, and with the passage of cold fronts in the winter. Snowfall does occur in the area, but this is a very minor source of precipitation.

Drought is also a characteristic feature of the climate of the area. Drought conditions commonly occur for periods of about two weeks between June and September. However, drought is also common in the months of August through October.

The study area is frost free for a period of approximately 218 days, with the last spring frost occurring toward the end of March and the first frost occurring at the end of October.

Soils

The study area is dominated by soils of the Sharkey series (Gray and Ferguson 1977). The two dominant units are the Sharkey Clay and the Sharkey-Steele Complex. Sharkey soils occur in poorly drained, level slackwater environments and are particularly abundant in the St. Francis River Floodway area. These soils have formed on thickly bedded clay-rich sediments.

Sharkey soils are poorly drained with low permeability and high water holding capacity. They consist of a very dark grayish brown clay surface horizon. The subsoil is a dark mottled clay. The parent material is dark gray and gray mottled silty clay and silty clay loam. These soils expand when wet and shrink and crack when dry, making them unsuitable for most non-agricultural land uses. These soils are highly fertile with medium to high organic matter contents (Gray and Ferguson 1977).

The Sharkey-Steele soil complex occurs on broad slackwater flats with slopes of less than one percent. Steele soils commonly occur on low mounds, with Sharkey soils between the mounds. Consequently the soilscape is slightly irregular. The Steele soils differ in character from the Sharkey soils by possessing a sandier surface horizon. The surface horizon commonly consists of a grayish brown loamy fine sand, rather than the dark grayish brown clay of the Sharkey soils. The upper part of the subsoil of the Steele soils is a pale brown and grayish brown loamy fine sand. The lower subsoil and parent material is a gray, mottled clay. Steele soils are lower in fertility than Sharkey soils. Permeability is low, and water capacity is low in the upper part of the soil, but high at depth. Organic matter content is low.

About 30 percent of this soil complex consists of Sharkey soils, 30 percent are transitional Sharkey-Steele soils, and 30 percent are Steele soils.

Vegetation

Vegetation of the area is dominated by cultivated crops consisting mainly of cotton, soy beans, and rice, with small areas of orchard crops. The natural vegetation, of which little remains, consists mainly of seasonally wet forests, swamp, and river margin species. Swamps, sloughs, and lakes, such as Lake St. Francis, support a vegetation community dominated by bald cypress and water tupulo. Associated species include button bush, southern wild rice, and swamp loosestrife (Smith et al. 1984).

Poorly drained backwater basins support a vegetation community dominated by overcup oak and water hickory. Associated shrubs in these areas include water locust, water elm, haws, and

swamp privet. The understory, however, is generally dominated by pepper vine (Smith et al. 1984).

On the clay flats or low ridges associated with abandoned river meanders the dominant vegetation is commonly Nuttalls oak, together with willow oak and sweet gum. Common shrubs include Cataegus species and swamp privet. The understory commonly consists of vines such as wild grape, peppervine, lady's eardrops, and rattan. Many of these sites in the absence of Nuttalls oak, support extensive stands of oak, sugarberry, elms, and ashes (Smith et al. 1984).

River banks and adjacent lands commonly support cottonwood and black willow with smaller abundances of box elder and silver maple (Braun 1950:293-296).

Wildlife

Wildlife in the study area is associated primarily with either natural levees, which in places still support natural vegetation, or with ditches and streams. The principal mammals occurring in remaining hardwood communities include: white tailed deer, cougar, rabbit, gray fox, and gray squirrel. The wildlife associated with the ditches and streams include: beaver, mink, otter, and a wide variety of fish. The Arkansas Natural Heritage Commission reports a total of 87 different fish species from the St. Francis River Basin.

The principal birds of the area included: wild turkey, prairie chicken, ruffed grouse, passenger pigeon, and Carolina paroquet (Shelford 1963). These species are now extirpated or extinct.

ARCHEOLOGICAL SURVEY AND INITIAL SITE TESTING:

METHODS AND CONDITIONS

Fieldwork Conditions

The archeological survey of almost 17 miles of ditch corridor and the initial site testing of three sites was accomplished over a period of seven days by six persons. Weather during this period was cool and dry. However, it had rained the week before and the fields were saturated, muddy, and difficult to walk. Rain was encountered on the afternoon of the last day, and the lowest levels of Test Unit 1 at 3PO495 were excavated under wet conditions.

Screening clayey soils is difficult and wet clay soils are almost impossible to screen. The technique utilized was to throw all the sediments into a screen where they were sifted through 1/4 inch mesh and/or carefully troweled through. At 3PO493 the sediments consisted of a plastic clay which was squeezed through hands.

Crew Organization

When surface visibility was good, the field crews were divided into two or three survey teams with two or three persons each. Each team was directed by a Co-Field Director (Carol S. Spears and Robert A. Taylor) or the Project Supervisor (Michael G. Million). Crewmembers on the project were J. K. Finney, Robin Toole, and Sharon Myers. Most of the time, the crews operated semi-autonomously. However, the teams coordinated transects such that a vehicle would be at the end of the transect, so that no one team had to backtrack over the same area.

In areas where there was no surface visibility, the entire field team worked on the transect but split into two groups of three persons. In each group one person dug the shovel test while the other two screened the sediments.

Survey Techniques

Depending upon the surface visibility and vegetation in the area, either pedestrian transects or shovel testing on transects were accomplished. Pedestrian surveys were used for about 14.5 linear miles and shovel testing on transects for 2.5 miles. A summary table of vegetation and surface visibility during these investigations is presented in Table 1.

Table 1. Vegetation and Surface Visibility Estimates in the Project Corridor.

VEGETATION	VISIBILITY	MILES
Plowed Fields	80-100%	3.50
Cut or Sparse Soybeans	50-95%	4.75
Low Winter Wheat	40-60%	2.25
Cut Milo	60%	.25
Weeds	30-80%	2.25
Cut Rice	10-30%	.75
Pond Spoil	0%	.75
Woods and Pecan Grove	0-05%	2.50

Fields Along Ditches

Fields with at least 10% or better surface visibility were systematically walked. In these areas, crewmembers were spaced 15-30 m apart and walked in zig-zag fashion over the field and parallel to the ditch. Any sites found were initially evaluated and plotted on day maps. Only diagnostic artifacts were collected at this time and these were tied into a temporary datum which was later mapped in with a transit.

On a return visit, all artifacts were marked with wire flags and their position mapped with a transit; or, if the density was high enough, controlled surface collections were made. Subsurface units were excavated at that time and a site map was drawn.

Wooded Areas Along Ditches

About 2.5 miles of the project were wooded and had little to no surface visibility. In these areas, two survey teams were spaced about 30 meters apart, and screened shovel tests were excavated every 30 meters.

The shovel tests were at least 30 cm in diameter and excavated to at least 50 cm. All sediments removed were screened through 1/4 inch mesh or carefully troweled through if the sediments were too clayey to screen. When cultural materials were found, the sediment levels in the test were accurately measured and described, and the depth of the artifacts or cultural level was recorded. All positive shovel tests excavated on archeological sites were profiled. Disturbed areas such as the spoil pile were shovel tested in some places in order to examine whether the previous ditch cleaning had disturbed or cut through a site.

Survey Records

The team leaders were responsibile for recording information relative to transects and sites found. Arkansas site forms were filled out by these individuals upon completion of the project.

At the end of each day, all temporary (or daily) site numbers were logged into the Daily Site Log and given a consecutive project number. These numbers were written on the artifact bags and each bag was logged on the Field Specimen Log. All sites and transects were plotted on the project maps or appropriate quadrangle. Daily Transect information was logged into a chart in the field notebooks. Information included the transect number, distance covered, the quad map, the survey methods, the number of shovel tests, sites located, vegetation, soils, surface visibility, disturbances, obstructions to survey, sites found, and general comments.

On-Site Investigations

A prehistoric site is defined as the location of at least one prehistoric behavior, depositional event, activity, or behavior as evidenced by one or more artifacts. Thus, prehistoric isolated finds including nondiagnostic artifacts are considered sites. However, historic sites had to contain a prominent feature or cluster of artifacts, or possess architectural or vegetation evidence, and date earlier than 1930. Miscellaneous historic debris, which has been strewn randomly over much of the landscape, and recent dumps along roads and in ditches were not recorded as sites. The locations of these scatters in fields were plotted on day maps which were then given to the project historian to verify construction and occupation periods. All historic structures within the project area were photographed. The historic information and artifacts from sites tested were analyzed by the project historian, who conducted additional research on the property.

During the initial discovery of prehistoric sites, preliminary information was gathered concerning the context of the site. In addition to descriptive field notes, this information included an assessment of the potential for intact deposits or features, artifact density, temporal affiliation, unique artifacts, and research potential. These evaluations were used to determine which sites warranted initial site testing.

Sites in Fields

In areas of adequate visibility (10-100%), such as the cleared or cultivated fields at the Phillips Site (3PO493), where artifact densities were relatively high, controlled surface collections were made. Rows of 4 m x 4 m units were laid out with wire flags and all artifacts in each square were collected.

The collection rows were oriented such that they crossed over the center of the site in several directions. In addition, diagnostic artifacts found outside the collection grid were point plotted. When artifact densities were low, such as at Site 2 and the Cooper Estate Site (3PO494), all artifacts were point plotted using a transit, stadia, and tape.

Sites in Wooded or Vegetated areas

At the Ritter Pecan Grove Site (3PO495) a positive shovel test (one containing prehistoric or historic material) was found on a transect and other shovel tests were excavated at 10 m intervals from the first test in the cardinal directions. Additional shovel tests were positioned 10-30 m from these. Boundaries of the site were defined by the shovel tests and the edge of the terrace at the contact of the old channel.

Test Units

A minimum of one 1 m x 1 m test unit was excavated at each site discovered unless it could be conclusively demonstrated that no signficant intact cultural resources occurred at the site. This unit was excavated to determine if the site was eligible or not eligible for nomination to the National Register of Historic Places and whether it would need further work. Units were laid out according to magnetic north, and all depth measurements were taken from the line level string attached to the southwest corner of the unit.

The plowzone was either excavated in 10 cm levels or as one unit. All other levels were excavated according to cultural or natural levels of not greater than 10 cm in depth. Levels were troweled or shovel skimmed and all soil removed was dry screened through 1/4 inch mesh. The base of each level was scraped with a trowel, photographed, drawn, and examined closely for features. When feature stains or clusters of artifacts were found, they were mapped, described, and photographed; and artifacts found in features were given a separate provenience number.

A portion of each test unit was excavated at least 2 levels below cultural bearing levels. Once a test unit was completed, one wall was cleaned, photographed, and profiled. Soil colors were described according to the Munsell Color designations. Upon completion, each unit was backfilled.

Site Mapping

A detailed map of the site including the work performed was drawn using a transit, stadia, and tape. All measurements were tied into a metal pipe datum set at the ditch edge. This site datum was triangulated to at least two permanent reference points and when possible also tied into the Corps of Engineers surveying stakes and other permanent markers.

LABORATORY METHODS AND ARTIFACT CURATION

Lab Methods

All artifacts were returned from the field to the SPEARS laboratory and checked against the Field Specimen Catalog. They were then washed, air dried, and sorted. The collections include about 300 prehistoric artifacts, the majority of which are prehistoric lithics. Historic artifacts were sent to the project historian, Phyllis A. Morse, for analysis. Results of her work are presented later in this report. A sample of the Historic Analysis Form is presented in Appendix C.

Prehistoric artifact analyses were accomplished by Project Archeologists Robert A. Taylor and Carol S. Spears. Lithics in each provenience unit were sorted by raw material and by artifact class as described in Appendix D. The units and type of artifacts were counted and recorded on the Ditch 1 Analysis Forms developed for this project (Appendixes A and B). These analyses sheets included the kinds of artifacts expected to occur in the assemblage on the basis of field observations. However, some of the classes of artifacts listed on the form were not recognized in the collections during the analysis. There are, therefore, some empty classes. Diagnostic lithic artifacts were separated out for a more detailed analysis which was accomplished by Robert A. Taylor.

Ceramics were analyzed by both Project Archeologists Carol S. Spears and Robert A. Taylor. Ceramics were sorted macroscopically according to temper, surface treatment, and portion of the vessel. All sherds had plain surfaces and most contained a mixture of tempering agents. Sherd thickness was taken with metric calipers. Tempering agents were identified according to the criteria as presented in Appendix D. Identification of the tempering agents was difficult and they were not sorted with a high degree of confidence.

Artifact Curation

The artifacts and records generated from this project will be curated with the Arkansas Archeological Survey at the Jonesboro Station. This includes all cultural materials, all analysis forms, all field notes, and maps, etc. The following accession numbers have been assigned to the sites indicated:

Site Number	Accession Number
3PO493	86-984
Site 2	86-985
3PO494	86-986
Site 4	86-987
3PO495	86-988

These accession numbers precede the Field Specimen Numbers (FSN's) referred to in this text and in the tables and figures.

RESULTS OF THE ARCHEOLOGICAL SURVEY AND LIMITED TESTING OF PREHISTORIC SITES

Introduction

Five archeological sites were located during the project. Four of these were inside the project right-of-way and the fifth site was outside. Initial site testing was performed at three of the sites. All diagnostic artifacts mentioned in this text are further described in the following section of this report. Historic components and artifacts are discussed later in this report.

The Phillips Site (3PO493)

Description

The Phillips Site (3PO493) is a prehistoric and historic site positioned on the edge of a prominent terrace which lies adjacent to a depression once called Swan Lake. The site measures 130 m x 60 m and trends northeast to southwest (Figure 3). About half of the site lies within the project right-of-way. Approximately the western one third of 3PO493 had not been harvested but the soybean crop and the weeds were fairly sparse and surface visibility was about 85-90%. The remainder of the site had been harvested, tilled, and rained on. Visibility in this area was excellent (100%). Archeological investigations included 75 controlled surface collections, 3 shovel tests, and 2 1 m x 1 m test units.

Surface Material

Since the density of cultural materials seemed too high to map each artifact separately, controlled collections were conducted. Artifacts tended to cluster on the highest portion of the terrace, so the controlled collection grids were positioned across the highest part in two directions. Seventy-five 4 m x 4 m units were collected in three rows of 25 units each. The prehistoric artifacts collected are listed in Tables 2 and 3.

The distribution of artifacts in each 4 m x 4 m unit and mapped specimens are shown in Figure 3. The artifacts cluster on the highest part of the ridge which is shown between the two dotted lines. The surface finds which were mapped individually substantiate this patterning. However, there is a second concentration of material on the southwestern end of the site. This cluster is primarily due to plowzone erosion or soil deflation down the slope. All of the artifacts in this vicinity were collected from an erosional cut.

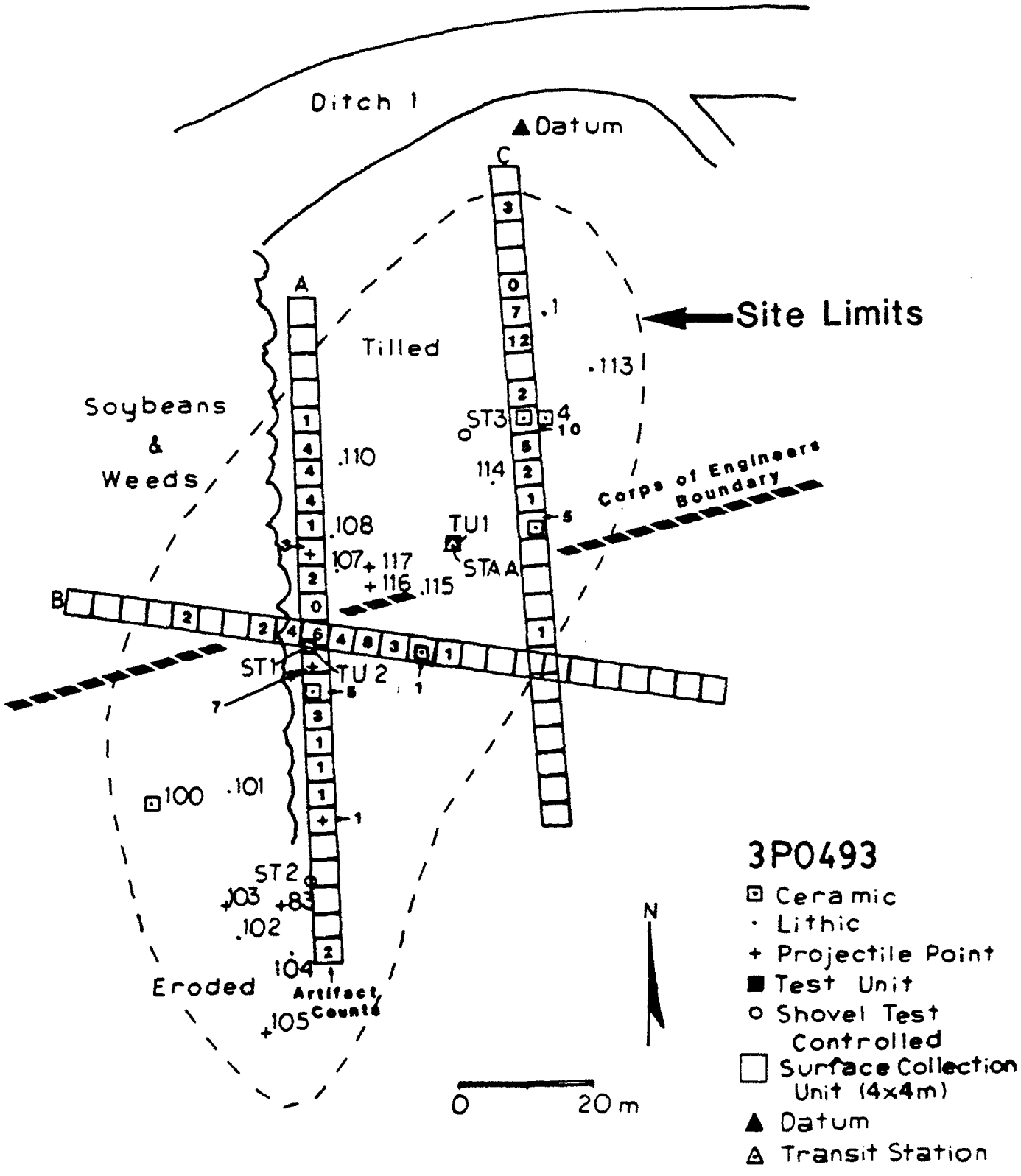


Figure 3. Map of the Prehistoric Component at the Phillips Site, 3P0493.

Table 2. Prehistoric Artifacts Collected in the Controlled Surface Collections, 3PO493.

ABBREVIATIONS USED: PP=Projectile Point/knife; O=Other tool; PRE=Preform; DR=Drill; UF=Utilized Flake; B=Biface; H=Hammerstone; PFLK=Primary Decortication Flake; SFLK=Secondary Decortication Flake; IFLK=Interior Flake; FCR=Fire-cracked rock; UNMOD=Unmodified Cobbles, Stones or Angular Fragments; S=Shell-Tempered Sherds; SS=Shell and Sand Tempered Sherds; G=Grog Sherds; GS=Grog and Sand Tempered Sherds; SA=Sand Tempered Sherds.

UNIT	PP	O	PRE	DR	UF	B	H	PFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SA	GS	TOTAL
A5											1							1
A6			1					1		1	1							4
A7									2	1	1							4
A8							1		1		2							4
A9										1								1
A10	1	(Gary-like)							1	1								3
A11									1			1						2
A14	1	(Side-notched)								1	5							7
A15									2			2					1	5
A16									1		2							3
A17				1														1
A18									1									1
A19					1													1
A20	1	(Weems)																1
A25										1	1							2
SUB-TOTAL	**3**		**1**	**1**	**1**		**1**	**1**	**9**	**6**	**13**	**3**					**1**	**40**

UNIT	PP	O	PRE	DR	UF	B	H	PFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SA	GS	TOTAL
B5										1	1							2
B8										1	1							2
B9										1		3						4
B10										1	1	4						6
B11									1		1	2						4
B12					1					1	4	2						8
B13					1					2								3
B14																1		1
B15								1										1
SUB-TOTAL					**1**	**1**		**1**	**1**	**7**	**8**	**11**				**1**		**31**

Table 2. (Continued)

UNIT	PP	O	PRE	DR	UF	B	H	FFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SA	GS	TOTAL
C2											2	1						3
C6											3	4						7
C7								1	2	1	3	5						12
C9										2								2
C10											5	3	1			1		10
C11								1				4						5
C12		1	(Hoe-chip, polished)									1						2
C13							1											1
C14									1	1	1	1			1			5
C18												1						1

SUB-TOTAL	PP	O	PRE	DR	UF	B	H	PFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SA	GS	TOTAL
	1						1	2	3	4	14	20	1	0	1	1		48

	PP	O	PRE	DR	UF	B	H	PFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SA	GS	TOTAL
TOTAL	3	1	1	1	2	1	2	4	13	17	35	34	1	0	1	2	1	119

The types of artifacts indicate that the site was occupied at least seasonally during the Early Woodland (Tchula phase) and Late Woodland period and then again during the Mississippian period. The lithic assemblage includes a relatively high proportion of whole tools, including two projectile points which have been reused as perforators. The density of the material is low and meaningful patterns or clusters of artifacts related to activity areas are not apparent. In addition, no temporally distinct spacial areas were observed.

Table 3. Artifacts Mapped and Collected outside the Controlled Surface Collections, 3PO493.

ABBREVIATIONS USED: PP=Projectile Point/Knife; O=Other tool; PRE=Preform; DR=Drill; UF=Utilized Flake; B=Biface; H=Hammerstone; PFLK=Primary Decortication Flake; SFLK=Secondary Decortication Flake; IFLK=Interior Flake; FCR=Fire-cracked rock; UNMOD=Unmodified Cobbles, Stones or Angular Fragments; S=Shell-Tempered Sherds; SS=Shell and Sand Tempered Sherds; G=Grog Sherds; SG=Shell and Grog Tempered Sherds.

FSN	Count	Artifact
1	1	Adz
2	1	Shell/Grog Tempered Sherd
3	1	Adz
4	1	Shell/Grog Tempered Sherd
83	1	Projectile Point/Knife Fragment
100	1	Grog Tempered Sherd
101	1	Interior Flake

Table 3. (Continued)

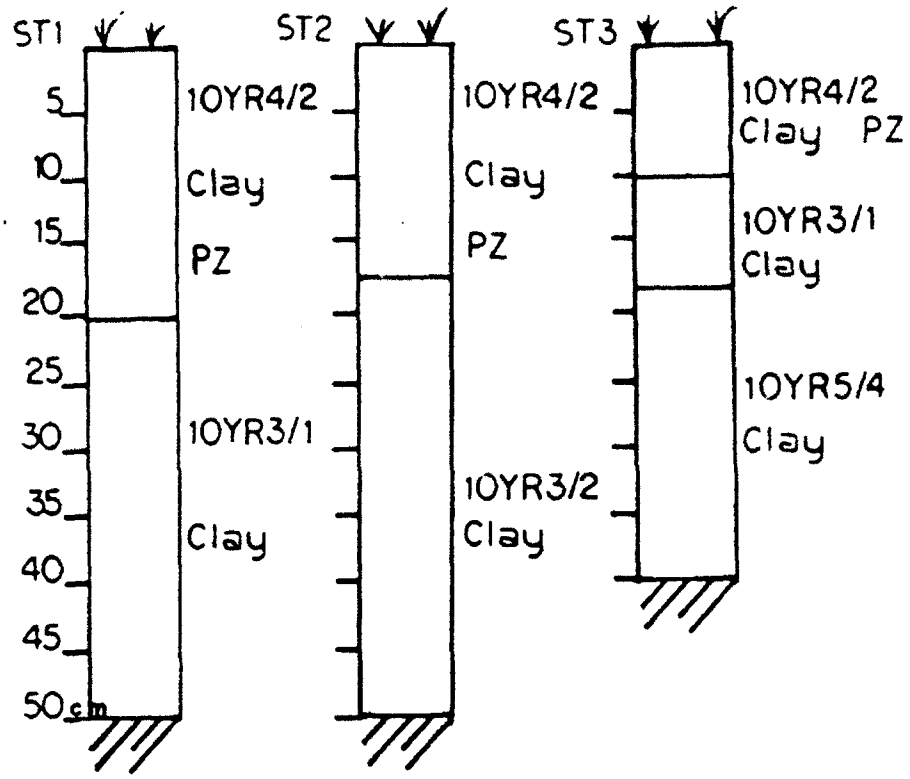
103	1	Untyped Corner Notched Projectile Point/Knife
104	1	Pitted Cobble with Edge Grinding
	1	Secondary Decortication Flake
105	1	Untyped Side Notched Projectile Point/Knife
107	1	Interior Flake
108	1	Interior Flake
	1	Unmodified Angular Fragment
110	1	Secondary Decortication Flake
113	1	Interior Flake
114	1	Secondary Decortication Flake
115	1	Preform
116	1	Projectile Point/Knife Tip
117	1	Straight Stemmed Projectile Point/Knife

	PP	O	PRE	DR	UF	B	H	PFLK	SFLK	IFLK	FCR	UNMOD	S	SS	G	SG	TOTAL
TOTAL	5	3	1						3	4		1			1	2	20

Shovel Tests 1, 2, and 3

All three shovel tests were excavated to 50 cm below the surface. Their profiles are shown in Figure 4. Shovel Tests 1 and 2 contained a plowzone from 0-20 cm below the surface which consisted of a dark grayish brown (10YR4/2) clay. Below the plowzone was a very dark gray and very dark grayish brown clay (10YR3/1 and 10YR3/2). Historic artifacts were collected from the plowzone, and the one small possible fragment of a core was found just below the break between the plowzone and the darker soil (Table 4). The soil below the plowzone did not have any characteristics of a midden. It did not contain organic material such as carbonized wood or other flecks of charcoal, and no burned clay was evident.

Shovel Test 3 was positioned on the slope of the site. It contained a thin plowzone level from 0-10 cm below the surface. Below this was a darker clay level which was only 15 cm thick. At this level there was a sharp break in the soil to a much lighter yellowish brown (10YR5/4) homogeneous clay. Artifacts were collected in the plowzone level, and one secondary decortication flake was found toward the top of the darker clay level (Table 4). This sediment did not contain any other characteristics of a midden. However, because of the suspicious nature of the darker soil, two 1 m x 1 m test units were excavated to further examine the nature and contents of the darker soil.



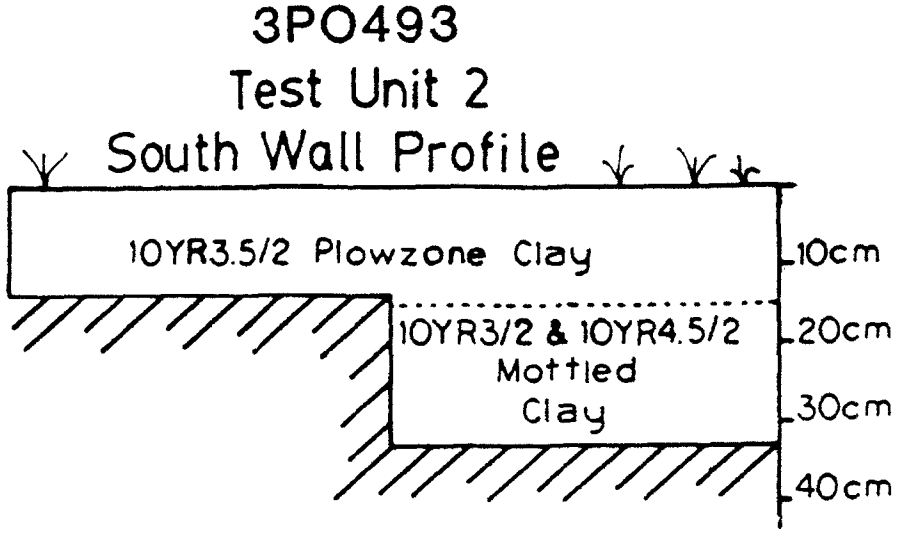


Figure 4. Profiles of Shovel Tests 1-3 and Test Unit 2, 3PO493.

Table 4. Artifacts Collected in Subsurface Units, 3PO493.

ABBREVIATIONS USED: SFLK=Secondary Decortication Flake; IFLK=Interior Flake; FC=Fired-clay; UNMOD=Unmodified Stone.

UNIT	DEPTH	CORE	SFLK	IFLK	FC	UNMOD	TOTAL
ST1	20-50	1				1	2
ST3	0-10		1	1	1		3
	10-25		1				1
					TOTAL		6

Test Unit 1

Test Unit 1 was positioned on the top of the rise in the vicinity of Transit Station A. The 1 m x 1 m unit was excavated by shoveling the wet plastic clay out of the unit into the screen and squeezing through the clods feeling for artifacts. All of the plowzone was removed in this fashion and immediately below this level was the lighter colored yellowish brown (10YR5/40), highly plastic clay. No prehistoric artifacts were found in the plowzone or in the next level from 15-25 cm. Because the dark suspicious soil was not present in this location, a second unit was opened 20 cm north of Shovel Test 1.

Test Unit 2

In Test Unit 2, the top 12 cm of sediments were removed and carefully examined. Only historic artifacts were found. The southeast corner of the unit was then excavated in 10 cm levels to 30 cm below the surface. The soil was mottled with both the dark and the lighter clay. No cultural materials or feature stains were observed. The south wall profile of Test Unit 2 is shown in Figure 4. Prior to backfilling, sediments from the unit were collected for texture analyses.

The subsurface tests at Site 1 did not show evidence of intact cultural deposits. Agricultural practices such as repetitive plowing followed by soil erosion downslope have destroyed the seemingly shallow archeological site.

Site 2

Description

Site 2 is an isolated find of one grog and sand tempered, plain body sherd on a dirt airstrip constructed parallel to Ditch

1. The airstrip was planted in winter wheat. The area where the sherd was found had been rooted by hogs and visibility was about 60%. No other cultural materials were observed during examinations of the airstrip, the nearby ditch bank, and the adjacent field.

Landowner Interview

Because the sherd appeared to be redeposited, the owner of the airstrip was interviewed to determine the source of the spoil used to construct the airstrip. The owner, Mr. John Brunner of Marked Tree, said that the sherd certainly would have been redeposited. He had removed most of the original spoil bank along the north side of Ditch 47 to use as fill at his nearby motel. Some of the fill was then graded to about one foot above the natural land surface. Then three to four inches of sand were added to the surface of the airstrip. This sand was derived from another spoil bank along Tulot Seep Ditch near Payneway, about 10 km west of the airstrip. Mr. Brunner said that it was very likely that the sherd came from the spoil bank near Payneway.

Since the sherd was found on an airstrip about one foot above the natural land surface, it had been transported some distance from its original context. It may have originated at an undiscovered site along Ditch 47 or at a site along Tulot Seep Ditch about 3 km north of Payneway. The nearest known sites to Site 2 are 3PO319 and 3PO493. The landowner's account and the relationship of these sites to Ditches 1 and 47 make it unlikely that the sherd derived from either of these sites.

The Cooper Estate Site (3PO494)

Description

The Cooper Estate Site (3PO494) was first recorded as a cluster of four sherds within a one meter radius on a terrace edge near the lower end of Ditch 1 (Figure 5). Although visibility was near 100% in a harvested and disked cotton field that had been rained on, no other artifacts were observed during the initial survey. During site mapping and testing on the following day, with dryer soil conditions, eight additional sherds were found on the surface. These are listed in Table 5.

Shovel Tests

Six shovel tests were excavated at 10 m intervals on a grid oriented magnetic north. Shovel Test ONOE was located where the four sherds were collected during the initial survey. In one shovel test (10SOE), a single sherd was found in the plowzone (Table 6). No cultural materials were found in any of the other shovel tests. All shovel tests were excavated to at least 50 cm below the surface (Figure 6). The plowzone varied from a thickness of 10 cm on the slope of the terrace edge near Ditch 1 to 17 cm thick on the higher, flatter part of the

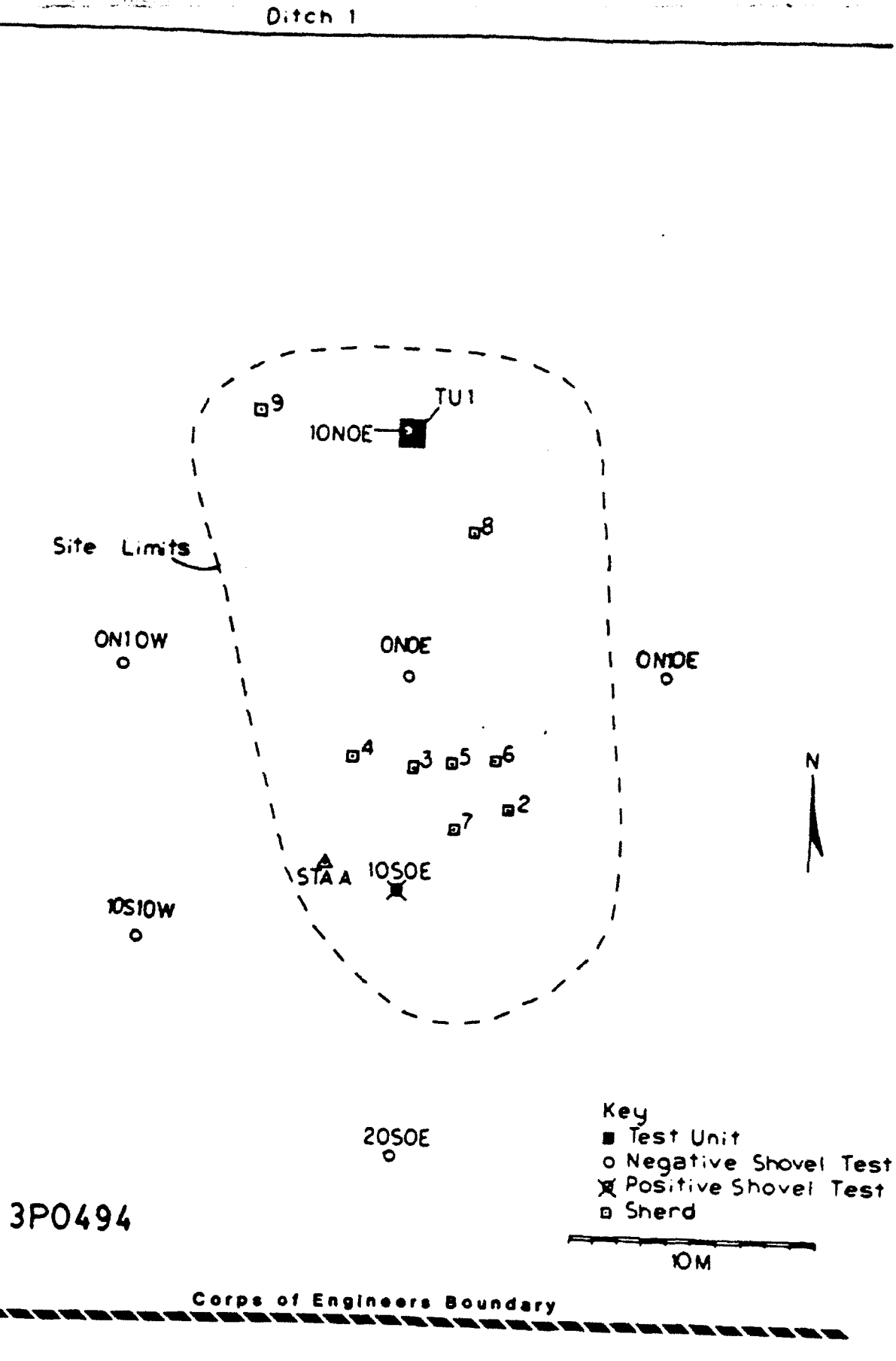


Figure 5. The Cooper Estate Site, 3P0494.

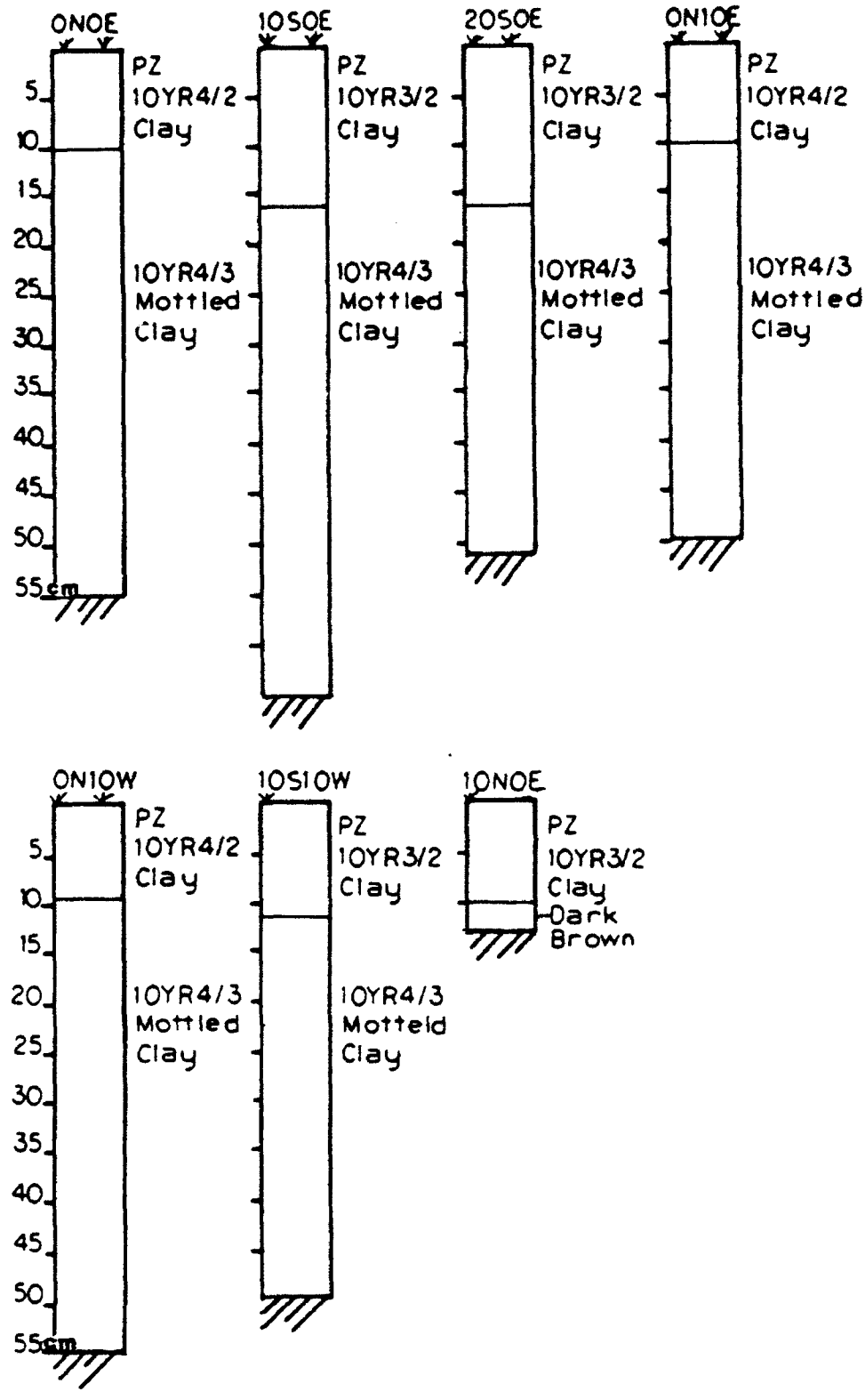


Figure 6. Profiles of Shovel Tests, 3PO494.

terrace. The plowzone on the slope was a dark grayish brown clay (10YR4/2), and on the top of the terrace it was a very dark grayish brown clay (10YR3/2). From the base of the plowzone to the base of excavation in all shovel tests, the sediments were a brown to dark brown clay (10YR4/3) lightly mottled with yellowish brown.

Table 5. Ceramics Collected on the Surface of 3PO494 (listed by tempering agents).

FSN	SHELL	SHELL/GROG	SHELL/SAND	SAND	SAND/GROG	GROG	TOTAL
1	3	1					4
2				1			1
3				1			1
4					1		1
5	1						1
6	1						1
7			1				1
8	1						1
9	1						1
TOTAL	7	1	1	2	1		12

Table 6. Ceramics Collected in Subsurface Units at 3PO494.

UNIT	SHELL	SHELL/GROG	SHELL/SAND	SAND	SAND/GROG	GROG	TOTAL
10SOE							
0-20	1						1
TU1							
0-11						1	1
TOTAL	1					1	2

Test Unit 1

In one shovel test (10NOE), a small area of dark soil containing burned clay was also recognized. Test Unit 1 was located around this shovel test to investigate what appeared to be a prehistoric feature truncated by the plowzone. After excavation of Test Unit 1, during which only 1 sherd was found (in the plowzone) (Table 6), the dark soil was interpreted to

be fill in a root cast, very irregular in all dimensions and having small, rotted roots and root-like projecting stains around its periphery. The entire fill of the feature was collected for water screening. Only six very small fragments of low-fired clay were found in the water screened fill. These fragments are probably the result of burning a tree stump, and are probably not prehistoric artifacts.

Summary

A total of 14 plain body sherds were collected at the Cooper Estate Site (3PO494). Twelve of these were on the surface, one was in a shovel test, and one in Test Unit 1. Of the 14 sherds, eight are shell tempered, one is shell/grog tempered, one is shell/sand tempered, two are grog tempered, and two are sand tempered.

Two thick shell tempered sherds may be Wyckliffe Thick, an Early Mississippian type. The combination of tempering agents in two sherds (shell/grog and shell/sand) may also represent an Early Mississippian component. However, the sherds and the sample are too small to be definitely assigned to the Early Mississippian time period and may be later.

The grog tempered sherds and sand tempered sherds probably represent a Woodland component. These plain and eroded sherds cannot be identified as a particular type or assigned to a specific Woodland phase.

The Cooper Estate Site (3PO494) apparently represents limited occupations during both the Woodland and Mississippian periods. The components are restricted to the surface and plowzone of the eroded site and are mixed in those contexts. The site integrity has been destroyed by unknown events and by modern farming operations, and therefore little useful information remains.

Site 4

Description

Site 4 consisted of an isolated find of one grog and shell tempered sherd found outside the Ditch 1 project area. It was observed while returning to a vehicle after a survey transect along Ditch 1. The sherd is a small, plain, body sherd which was found in a harvested and disked cotton field that had been rained on and had almost 100% visibility. The area was walked at ten meter intervals to a radius of 60 meters from the isolated find. No other cultural materials were observed.

This sherd was in the same field as the Cooper Estate Site (3PO494) and could have been transported from that site by modern agricultural equipment. The site could also represent a thin scatter of artifacts otherwise undetected by the 10 m survey interval, or it could represent a buried site. Because this site

was outside the project area, no subsurface tests were conducted. A site form was completed, but isolated nondiagnostic artifacts in northeastern Arkansas are not assigned permanent state site numbers.

The Ritter Pecan Grove Site (3PO495)

Description

The Ritter Pecan Grove Site (3PO495) is positioned on the edge of what used to be called Horseshoe Lake, which was probably an oxbow lake at the time the site was occupied. The site was discovered in a screened shovel test which was excavated on a shovel testing transect. There was no surface visibility in the area due to thick grasses and pecan trees. Archeological investigations performed included shovel tests at 10 meter intervals and the excavation of one 1 m x 1 m test unit (Figure 7). An intact midden about 30 cm thick was found buried about 12 cm below the surface. It contained organic materials and shell tempered ceramics which date the site to the Mississippian period. Based on these subsurface tests, site size is estimated as 25 m NE-SW x 20 m NW-SE. Site 3PO495 was probably the location of one or two houses which were occupied repetitively.

Shovel Tests

A total of five shovel tests were excavated at 10 meter intervals, in addition to the tests excavated on the transects. Shovel Test 1, the first positive test at the site, was excavated to 60 cm below the surface and its profile is shown in Figure 8. The upper layer did not contain any cultural material, but at about 20 cm below the surface there was a soil change and small pieces of fired clay were observed. At 40 cm below the surface there were large pieces of fired clay forming a level band in profile. The function of this burned feature was not determined. The midden continued another 10 cm below the fired clay band and then the soil changed to a dark grayish brown (10YR4/2) clay. Artifacts collected in this test are listed in Table 7.

Table 7. Artifacts Collected in the Shovel Tests, 3PO495.

ABBREVIATIONS USED: UNMOD=Unmodified Cobbles, Stones or Angular Fragments; S=Shell-Tempered Sherds; FC=Fired Clay.

UNIT	DEPTH	UNMOD	S	FC	TOTAL
ST1	MIDDEN	1	1	6	8
ST3	20-40			6	6
ST4	10-40			1	1
TOTAL		1	1	13	15

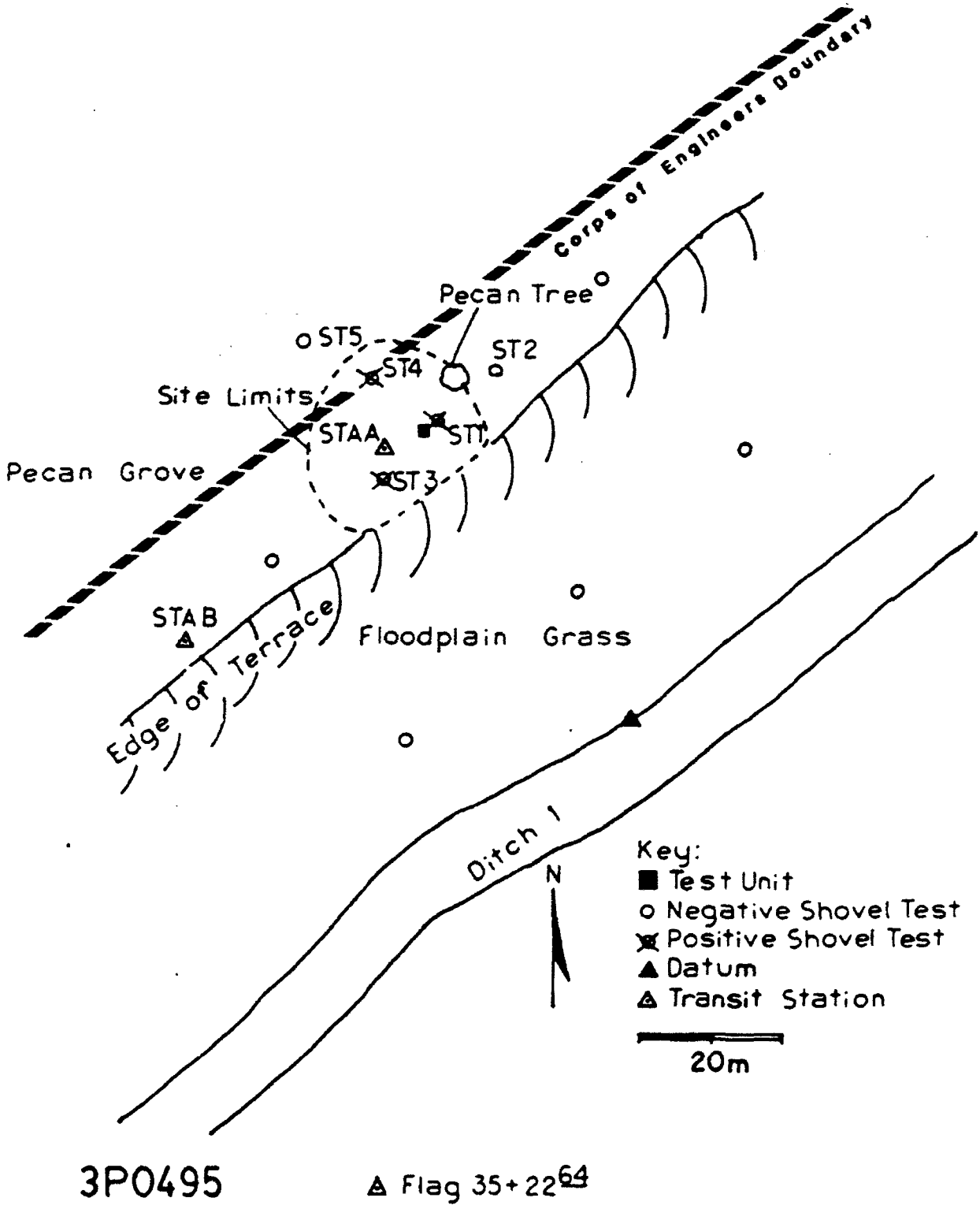


Figure 7. The Ritter Pecan Grove Site, 3P0495.

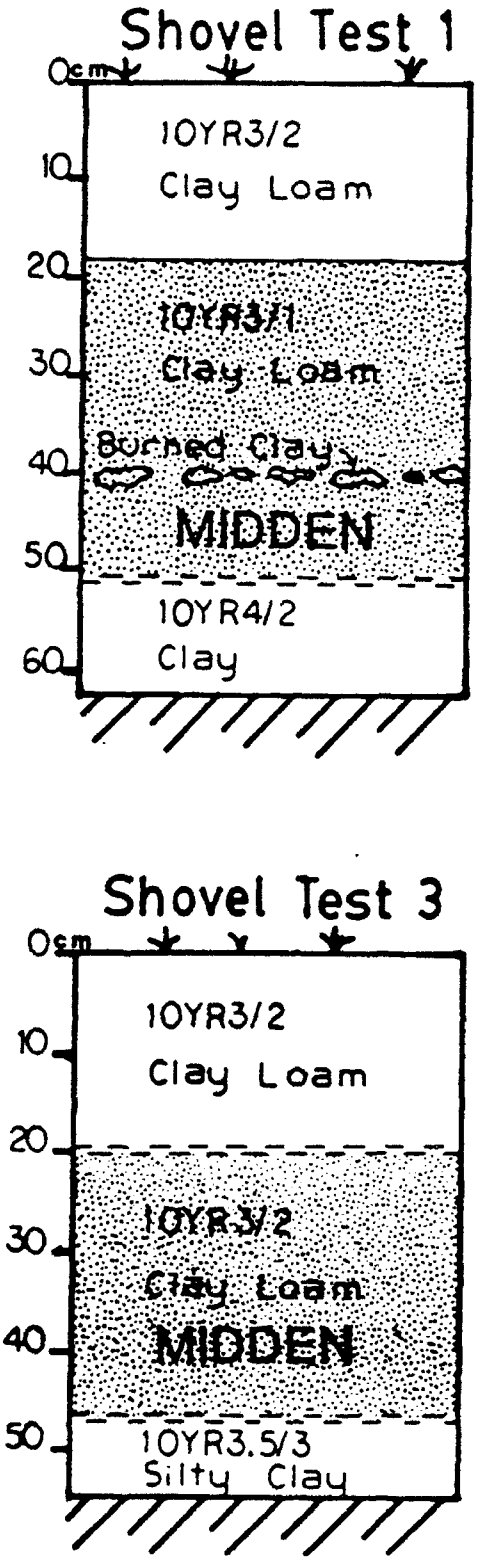


Figure 8. Profiles of Shovel Tests 1 and 3, 3PO495.

Shovel Tests 2, 4, and 5 were excavated to 50 cm below the surface. No prehistoric material was found in Shovel Test 2 or 5 and only one small piece of burned clay was collected in Shovel Test 4. The cultural level observed in Shovel Test 1 was not evident in these tests. Shovel Test 3, however, did contain the midden and 6 pieces of fired clay were collected in this test (Table 7)(Figure 8). Because the midden was evident in Shovel Test 1 and 3, a 1 m x 1 m test unit was positioned between these two units.

Test Unit 1

The sod was cut off the unit in squares and saved. Then, from below the sod to 15 cm the sediments were shovel shaved and screened. At about 13 cm below the surface the soil changed to very dark clay which contained sherds, charcoal, and burned clay. Most, if not all of the artifacts collected in this level were actually from the top of this midden. All cultural material collected in this unit is listed in Table 8. From 15-25 cm, the midden continued and 31 artifacts were collected in this level. Between 25-35 cm, the southern half of the unit began to have a mottled appearance. Fewer artifacts were found in this level. From 35-45 cm there seemed to be more burned clay in the northwest corner of the unit and the mottling increased throughout the level. From 45-55 cm there were fewer artifacts and the soil began to lighten. In the wall profile, it was evident that the base of this level was below the base of the midden. For the next three levels the southeast quarter of the unit was excavated. A cold, steady rain had begun and it was getting even more difficult to dig and screen. Only one sherd was collected from 55-65 cm below the surface and no artifacts were found in the two levels below (65-75 cm and 75-85 cm). The bases of all levels were scraped and no feature stains or concentrations of artifacts were observed. The profile of the unit is shown in Figure 9.

Table 8. Artifacts Collected in Test Unit 1, 3PO495.

ABBREVIATIONS USED: FCR=Fire-Cracked rock; S=Shell-Tempered Sherds; SS=Shell and Sand Tempered Sherds; FCWS=Fired Clay with Sand; FC=Fired Clay without Sand; RI=Reed Impressions Present; WC=Wood Charcoal Present.

DEPTH	FCR	S	SS	FCWS	FC	RI	WC	TOTAL
0-15	3	6	2	8	2		X	21
15-25		16		13	1	X	X	30
25-35		4	1	2	2			9
35-45	2	5	7	11	14	X		39
39			1					1
45-55		11		6	1			18
56			1					1
55-65		1						1
TOTAL	5	43	12	40	20	X	X	120

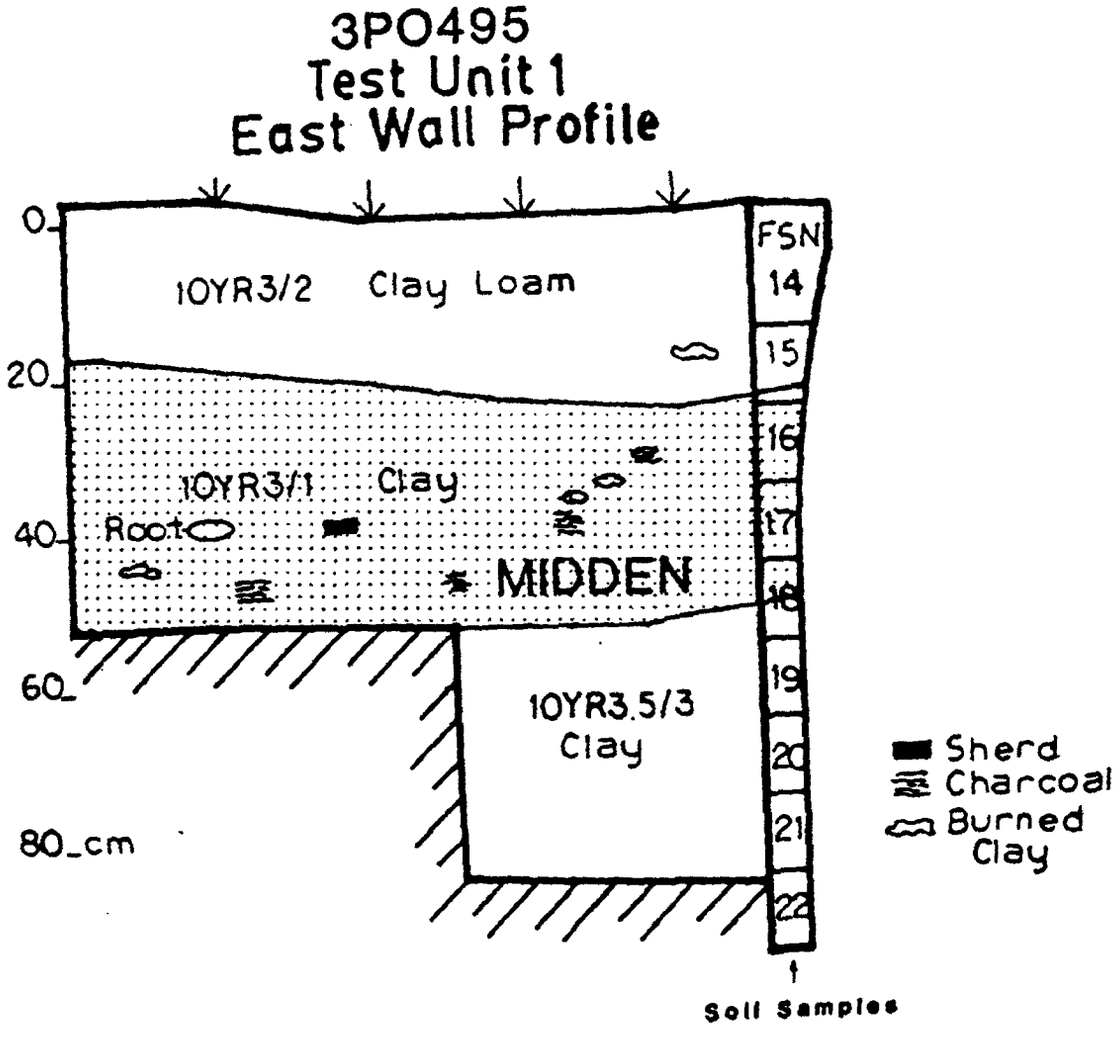


Figure 9. Profile of Test Unit 1, 3PO495.

Charcoal was collected from three of the excavation levels in Test Unit 1. These samples were submitted for radiocarbon dating to Beta Analytic, Inc. All samples were pretreated in the usual manner and counting proceeded normally without corrections (T 1/2=5568). Sample 86-988-7 (Beta 21315) was several small fragments of wood charcoal collected from the 15-25 cm level of Test Unit 1. Sample number 86-988-8 (Beta 21316) was a larger sample of several wood charcoal fragments, collected from the 25-35 cm level of Test Unit 1. Sample number 86-988-10 (Beta 21317) was a single, moderately large fragment of wood charcoal collected from the 35-45 cm level in Test Unit 1. All samples were collected from the apparent midden, and none appeared to be associated with intrusive features.

Sample 86-988-7 (Beta 21315) produced a radiocarbon date of 970 $\pm$ 170 B.P. The large statistical error associated with this date is a result of the small size of the sample. Sample 86-988-8 (Beta 21316) produced a date of 900 $\pm$ 90 years B.P. Sample 86-988-10 (Beta 21317) dated to 520 $\pm$ 90 years B.P.

Two of these dates (Beta 21315 and 21316) are in close agreement with each other and also with a postulated Early Mississippian assignment for the cultural affiliation of 3PO495. The third date (Beta 21317) falls into the Late Mississippian time period. However, this date is not in agreement with the other two samples, which were in a stratigraphically higher and younger provenience. It is doubtful if there is a Late Mississippian horizon in the 35-45 cm level of 3PO495. It is possible that an intrusive Late Mississippian pit feature or post may not have been detected. However, no other evidence from the site indicates a Late Mississippian affiliation and Beta 21317 may have been contaminated or may be a remnant of an oxidized tree root which post dated the Early Mississippian occupation of the site.

DIAGNOSTIC PREHISTORIC LITHICS AND CERAMICS

Lithics

The Phillips Site (3PO493)

A total of 207 lithic artifacts were collected at the Phillips Site (3PO493). The distribution and classification of these artifacts are presented in Figure 3 and Tables 2, 3, and 4. Individual descriptions of those artifacts which were classified as tools are presented below and measurements are given in Table 9. Nine projectile points and point fragments were collected. Other artifacts include an unhafted biface, two adzes (one is fragmentary), one flake with use polish, one utilized flake, one pitted cobble with abraded edges, and two hammerstone fragments.

FSN 103-1 is an untyped corner notched projectile point resharpened to a perforator-like tip (Figure 10h). The corner notches create a stem that is slightly expanding. Heat fractures on one face have removed part of the base. The artifact is made from a mottled gray and dark gray chert with a tan inclusion. According to Dan F. Morse (personal communication), the resharpening to a perforator-like tip is a Late Archaic trait, and the point probably belongs to that cultural period.

FSN 23-1 is a Weems or Weems-like projectile point (Figure 10f). It has an expanded stem with a straight base and prominent barbs. One barb is broken. The blade edges are straight to slightly convex. The base and stem edges are straight. The stem has thinning "flutes" on both faces extending onto the blade. This characteristic has been noted on other Weems points collected in northeast Arkansas (Dan F. Morse, personal communication), and may represent a variety of Weems or a related, undescribed type. The artifact is made from a tan to light brown chert with fossil inclusions. Weems points date to the Late Archaic cultural period, but also extend into the Early Woodland (Tchula) period (Morse and Morse 1983:118).

FSN 14-3 is a Gary-like contracting stem projectile point with weak shoulders (Figure 10c). The distal portion of the blade is resharpened to a perforator-like tip. It is made on light brown chert with fossil inclusions.

FSN 117-1 is a straight stemmed projectile point with weak barbs (Figure 10k). The stem edges are nearly parallel and the base is nearly straight. The blade edges are slightly recurved. It is similar to the Burkett type (Chapman 1980:306; Morse and Morse 1983:118), and occurs in both Late Archaic and Woodland contexts. It is made of tan chert with fossil inclusions.

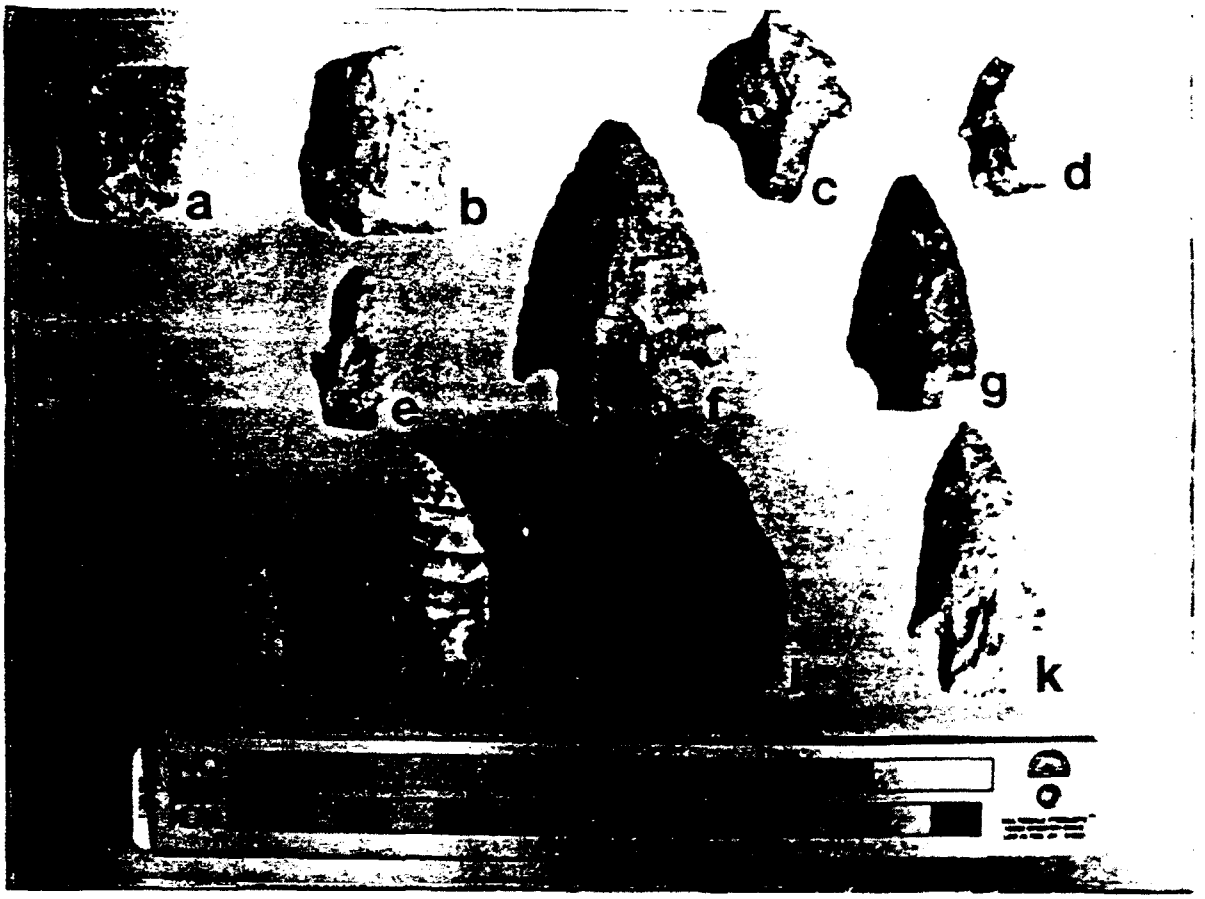


Figure 10. Selected Artifacts Collected on the Surface of 3PO493 (a:adz, 1-1; b:adz, 3-1; c:Gary-like contracting stem projectile point/perforator, 14-3; d:untyped shallow side notched projectile point, 17-3; e:drill, 20-1; f:Womems projectile point, 23-1; g:untyped stemmed projectile point, 83-1; h:corner-notched projectile point/perforator, 103-1; i:side notched projectile point, 105-1; j:ovate biface/preform, 115-1; k:Burkett-like straight stem projectile point, 117) (scale shown).

FSN 83-1 is an untyped stemmed projectile point (Figure 10g). The blade edges are slightly convex. The stem is broken but appears to have been slightly expanded. It has weak shoulders and it is made from light brown chert with red at the distal tip.

FSN 105-1 is an untyped side notched projectile point with a convex base (Figure 10i). The blade edges are also convex. Dan F. Morse (personal communication) identified this as a Late Woodland (Baytown) type. It is made of a strikingly banded tan and cream colored chert.

FSN 17-3 is an untyped shallow side notched projectile point (Figure 10d). The stem edges and base are slightly convex. The blade edges are straight, and the blade has been extensively resharpened. This extensive resharpening is a Late Archaic trait (Dan F. Morse, personal communication). The artifact is made on mottled tan and cream colored chert.

FSN 20-1 is an untyped projectile point midsection which has been reworked to a drill-like shape (Figure 10e). It has been extensively fractured by heat and it is made from pink chert with tiny, white inclusions. The color may be due to thermal alteration.

FSN 116-1 is an untyped distal tip of a projectile point reworked to a drill-like shape. It is made from grayish brown chert.

FSN 115-1 is an ovate biface (Figure 10j) It appears to be a preform with one steep lateral edge that may have been used as a scraper. It is made of brown chert lightly mottled with red.

FSN 1-1 is the butt of a bifacially flaked adz or chisel (Figure 10a). The lateral edges have heavy grinding and are nearly straight. One face is flat and the other is convex in cross section. It is made from tan chert with white fossils. Some red mottling is confined to the area just beneath remnants of a white cortex. This artifact was probably associated with the Mississippian component at 3PO493.

FSN 3-1 is a bifacially flaked adz or chisel (Figure 10b), which has probably been exhausted beyond resharpening. The butt is formed by a hinge fracture and has light hafting polish. It is made of lightly mottled tan chert. This may be a Woodland period tool.

FSN 63-1 is a flake with polish on one face. It is probably a chisel fragment but may be from a hoe, struck from a steep lateral edge near the bit. It is made from mottled white and gray chert.

FSN 41-1 is a utilized flake. It is a flake of secondary decortication with fine use retouch at the distal end and along the lateral edges adjacent to the distal end. Some very steep retouch along the right lateral edge may be the

result of edge damage from modern agricultural equipment. It is made from lightly mottled brown chert with light brown cortex.

FSN 104-1 is a pitted cobble with abraded edges. It may be a combination abrader and anvil stone. It has a shallow, basin-shaped pit on one face of a flat, sandstone cobble with a very shallow, irregular pit on the opposite face. The edges of the cobble are slightly battered or abraded.

FSN 12-4 is a hammerstone fragment. This is a sandstone cobble fragment with light battering on an acute corner.

FSN 67-1 is a hammerstone fragment. This is a broken cobble of poor quality made from mottled tan chert, with light to moderate battering along one edge.

Table 9. Measurements of Diagnostic Lithic Artifacts, 3PO493.

ABBREVIATIONS USED: FSN=Field Specimen Number; ML=Maximum Length; MW=Maximum Width; MT=Maximum Thickness; WS/B=Width of Stem at Blade Juncture; WS=Maximum Width of Stem; LS=Length of Stem.

FSN	ML	MW	MT	WS/B	WS	LS	Fig	ARTIFACT TYPE
103-1	33	31	7.3	16	18	11	7h	Corner Notched
23-1	61	43	10.8	25	27	12	7f	Weems
14-3	40	32	8.5	17	17	16	7c	Gary-like
117-1	56	30	11.4	18	19	13	7k	Straight Stemmed
83-1	>48	27	7.8	13	>13	> 8	7g	Stemmed
105-1	50	25	9.1	12	16	13	7i	Side Notched
17-3	28	20	8.4	15	18	13	7d	Side Notched
115-1	54	34	9.6				7j	Ovate Biface
1-1		>30	>9				7a	Adz Fragment
3-1	39	31	10.7				7b	Adz

In summary, the lithic tool types at the Phillips Site (3PO493) represent cultural periods ranging from the Late Archaic to the Mississippian. Although some of the identified projectile point types are common in the Late Archaic, those types are also found in Early Woodland components elsewhere. No stratigraphic evidence is available from 3PO493 to resolve their affiliation in this case. The presence of grog, grog/sand, and sand tempered sherds may indicate that the projectile points are more likely to be Woodland than Late Archaic. The entire lithic assemblage is quite similar to that at the McCarty site (3PO467), which has a significant Early Woodland (Tchula) component. At least one of the projectile points (FSN 105-1) is similar to Late Woodland (Baytown) artifacts. At least one and perhaps both adzes are similar to Mississippian adz styles.

The adzes, including the small flake with use polish, suggest that woodworking was one of the principal activities at 3PO493. These activities may have been conducted in conjunction with other extractive industries associated with the lowland environment around Swan Lake or a prehistoric channel which later became the lake. The projectile points with reworked distal tips also indicate either woodworking or bone reduction, or both.

The hammerstones and flake of secondary decortication indicate primary stages of lithic reduction and/or the manufacture of larger tools such as adzes. The predominance of Crowley's Ridge chert and the pitted cobble also suggest that the activities at 3PO493 were extractive and of local significance, rather than ceremonial or ideological (in which latter cases exotic cherts and symbolic artifacts would be expected). The tentative nature of these implications reflects the poor quality of the data base at this eroded site with mixed components.

The Cooper Estate Site (3PO494)

No lithic artifacts of any kind were observed or collected at the Cooper Estate Site (3PO494).

The Ritter Pecan Grove Site (3PO495)

No diagnostic lithics were collected at the Ritter Pecan Grove Site (3PO495). Five small fragments of fire cracked rock were found in Test Unit 1. Three of these were found between 0-15 cm, but near the top of the midden, and two were found near the base of the midden at 35 to 45 cm below the surface.

One fractured pebble, classified as an unmodified angular fragment during the lab analysis, was found in the midden level in Shovel Test 1. The fractures may be caused by thermal alteration, and do not appear to be purposeful reduction of the pebble.

Small pebbles were common in the midden fill in Test Unit 1, with 1 collected from 0 to 15 cm, 15 from 15 to 25 cm, 13 from 25 to 35 cm, 9 from 35 to 45 cm, and 1 from 45 to 55 cm. A tight cluster of 4 pebbles was found at 34 cm below the surface. These pebbles and their distribution are unexplained by current interpretations of prehistoric human behavior and may represent natural alluvial processes. No other lithic artifacts of any kind were found at 3PO495.

Ceramics

The Phillips Site (3PO493)

A total of eight sherds was collected from the surface of the Phillips Site (3PO493) (Table 10). All these were plain and

all are body sherds except for the one rim. The tempers represented were: one shell, two shell/grog, two grog, one grog/sand, and two sand. The shell tempered sherds probably date to the Mississippian period and the other types may be affiliated with the Early Woodland Tchula phase or even the Late Woodland. Since no decorated sherds were found, the chronological placement is tentative. The lithic artifacts, however, substantiate the Early Woodland, probably Tchula phase, Late Woodland, and Mississippian utilization of this area.

Table 10. Description of the Ceramics Collected on the Surface, 3PO493.

FSN	SIZE	THICK.	TEMPER	COLOR INT.	COLOR EXT	TYPE/COMMENTS
61-2	1.0-1.3	.4	shell	buff	buff	Mississippi Plain
2-1	small	?	shell/grog	buff	buff	
4-1	1.4-1.8	.8	shell/grog	orange	orange	
65-5	3.0-2.3	.7	grog	dk gray	orange	Baytown Plain
100-1	1.9-1.5	.6	grog	orange	orange	Baytown Plain
18-1	1.8-1.8	.5	grog/sand	buff	buff	
42-1	2.5-1.8	.7	sand	gray	orange	Barnes,flat rim
61-1	1.4-1.2	.5	sand	dk.gray	buff	Barnes

Site 2

One grog/sand tempered body sherd was collected at Site 2. It measures 2 x 2.2 cm and is .5 cm thick. It has a gray exterior and an orange and gray interior.

The Cooper Estate Site (3PO494)

Fourteen sherds were collected from the surface of the Cooper Estate Site (3PO494) (Table 11). All of these are plain body sherds and the following tempers were represented: eight shell tempered, one shell/grog, one shell/sand, one sand/grog, two sand, and one grog. The predominance of shell tempered pottery at the site and the multiple temper agents within the sherds are typical of Early to Middle Mississippian ceramics, although the sand tempered and grog tempered sherds may date to the Late Woodland.

Table 11. Descriptions of the Ceramics Collected on the Surface, 3PO494.

FSN	CT	SIZE	THICK.	TEMPER	COLOR INT.	COLOR EXT	TYPE
1-1A	1	7.6x3.5	1.1	shell	gray	orange	Mississippi Plain
5-1	1	4.1x3.8	1.1	shell	gray	orange	Mississippi Plain
8-1	1	crumb	--	shell	gray	orange	Mississippi Plain
9-1	1	1.3x1.2	.4	shell	black	orange	Mississippi Plain
10-1	1	1.9x.7	.7	shell	gray	orange	Mississippi Plain
1-1	1	2.8x1.8	.6	shell	orange	buff	Mississippi Plain
1-1	1	2.3x2.0	.7	shell	buff	buff	Mississippi Plain
6-1	1	2.2x1.8	.5	shell	orange	buff	Mississippi Plain
3-2	1	1.6x.9	.5	shell/grog	buff	buff	
7-1	1	1.4x1.1	.6	shell/sand	orange	orange	
4-1	1	2.6x2.2	.6	sand/grog	buff	buff	
2-1	1	3.1x2.7	.8	sand	gray	gray	Barnes
3-1	1	3.2x2.7	.5	sand	gray	gray	Barnes
11-1	1	2.0x1.4	.8	grog	tan	buff	Baytown Plain

Site 4

One sherd was observed and collected from Site 4. It is a plain, grog and shell tempered body sherd measuring 1.2 x 1.0 cm and .5 in thickness. It is buff in color.

The Ritter Pecan Grove Site (3PO495)

All sherds collected at the Ritter Pecan Grove Site (3PO495) had shell or shell/sand tempering (Table 12). Ten of the shell/sand tempered sherds had only small amounts of sand. Only two shell/sand sherds actually had a sandy or gritty feel. Two of the sherds had slipped interiors and are probably of the type Varney Red Filmed. One small fragment of a rim with a rounded lip was collected. No other decorated sherds or diagnostic lithic artifacts were found. The chronological assignment to the Early Mississippian period is tentative, but is supported by two of the three radiocarbon dates of A.D. 810-1150 and A.D. 960-1140 taken from the midden at the site.

Table 12. Descriptions of the Ceramics Collected at 3PO495.

Shovel Test 1

FSN	CT	SIZE	THICK.	TEMPER	COLORS	TYPE
1-2	1	3.1x2.7	.5	shell	orange	Mississippi Plain

Test Unit

10-15 cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
6-3	6	.4 - 11.3	.5-.9	.7	shell	buff	Mississippi Plain
6-4	2	.5-1.8	?		s/s	tan	

15-25cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
7-6	1	1.8x1.2	.4		shell	buff	Varney Red Filmed
7-5	15	.6-3.5	.4-.9	.5)	shell	brown,buff	Mississippi Plain

25-35cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
8-3	4	1.7-5	.4-.7	.5	shell	buff,gray	Mississippi Plain
8-4	1	2.0x1.4	.6		s/s	gray	Varney Red Filmed

35-45cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
9-3	5	1.4-2.5	.4-.6	.5	shell	buff	Mississippi Plain
9-4	8	.5-3.5	.3-.9	.6	s/s	buff	

45-55cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
11-2	1	1.8x1.0	.5		shell	orange	rim,Mississippi Pl.
11-1	10	.5-5	.5-.9	.7	shell	buff	Mississippi Plain

55-65cm

FSN	CT	SIZE RANGE	THICK. RANGE	MEAN	TEMPER	COLORS	TYPE
13-1	1	1.1x1.0	.5		shell	lt.gray	Mississippi Plain
12-1	1	3.5x2.8	.7		s/s	buff	

HISTORIC COMPONENTS AND ARTIFACTS

by Phyllis A. Morse

Introduction

Five historic scatters, one multicomponent prehistoric and historic site (3PO493), one recent church, and several late historic houses were found during the archeological survey of about 17 miles of Ditch 1. Only the historic scatters and the Phillips Site (3PO493) had potential components older than 50 years.

Historic Scatters

A brief description of the five historic scatters (H1-5), which were considered twentieth century, and a list of the artifacts observed at each location were evaluated as to their potential antiquity and their significance. The assemblages observed at these locations included items such as whiteware, glass, crockery, rubber, pressed glass, etc.

The 1956 Marked Tree Quadrangle was examined and Historic Scatters 3, 4, and 5 were not mapped as containing structures. However, four structures were shown in the vicinity of H1 and one structure was evident at H2. Poinsett County courthouse tax records were evaluated for all five locations. These records do not state when or if buildings were present but a comparison of the land value assessments between 1909 and 1923 indicates if improvements were made. The results of this comparison are shown in Table 13. Improvement must have occurred at H3 between 1914 and 1923, because the comparative value is much higher. However, the field observations indicated only a very light scatter at H3. It is possible that the "structure" may have actually been located farther from the ditch and that the scatter observed was secondary refuse associated with but only on the periphery of the occupation. The five historic scatters were not found to be potentially early or significant. State site numbers were not assigned to these locations.

Table 13. Comparative Value of Property at 5 Historic Scatters in Poinsett County Based on Tax Records.

SITE	SECT.1909	SECT.1914	SECT.1923
H1	640	1200	S&E D1 2500
H2	425	1000	1200
H3	whole 2880	1/4 1280	1/4 3700
H4	whole 2880	1/2 2880	S&E D1 2250
H5	688	1420	2600

The Phillips Site (3PO493)

Description

The Phillips Site (3PO493) is a historic and prehistoric site situated on the south side of Ditch 1. The prehistoric component has been described in an earlier section of this report. The historic component consists of a late nineteenth and early twentieth century house site scatter (Figure 11). On the 1923 GLO's the Joseph D. Phillips house is mapped on the edge of a depression which was called Swan Lake. Although there are slight discrepancies between the location of this site and the Phillips house, it is possible that the 1923 map was slightly inaccurate.

Investigations at the Phillips Site included controlled surface collections, subsurface tests, and site mapping. The location of the subsurface units was presented in Figure 3. A map of the historic component is shown in Figure 11.

Subsurface Tests

Two 1 m x 1 m test units and three shovel tests were excavated at the site. The profiles of these units are shown in Figure 4. Historic artifacts were found only in the top plowzone portion of these tests. In Shovel Test 1 (0-20cm), one round nail and four brick fragments were collected. In Test Unit 1 (0-15 cm), two round nails, one piece of green window glass, and one piece of whiteware were found. In Test Unit 2 (0-12cm), one square nail and three brick fragments were collected. No historic features or intact levels were evident in any of the subsurface tests and

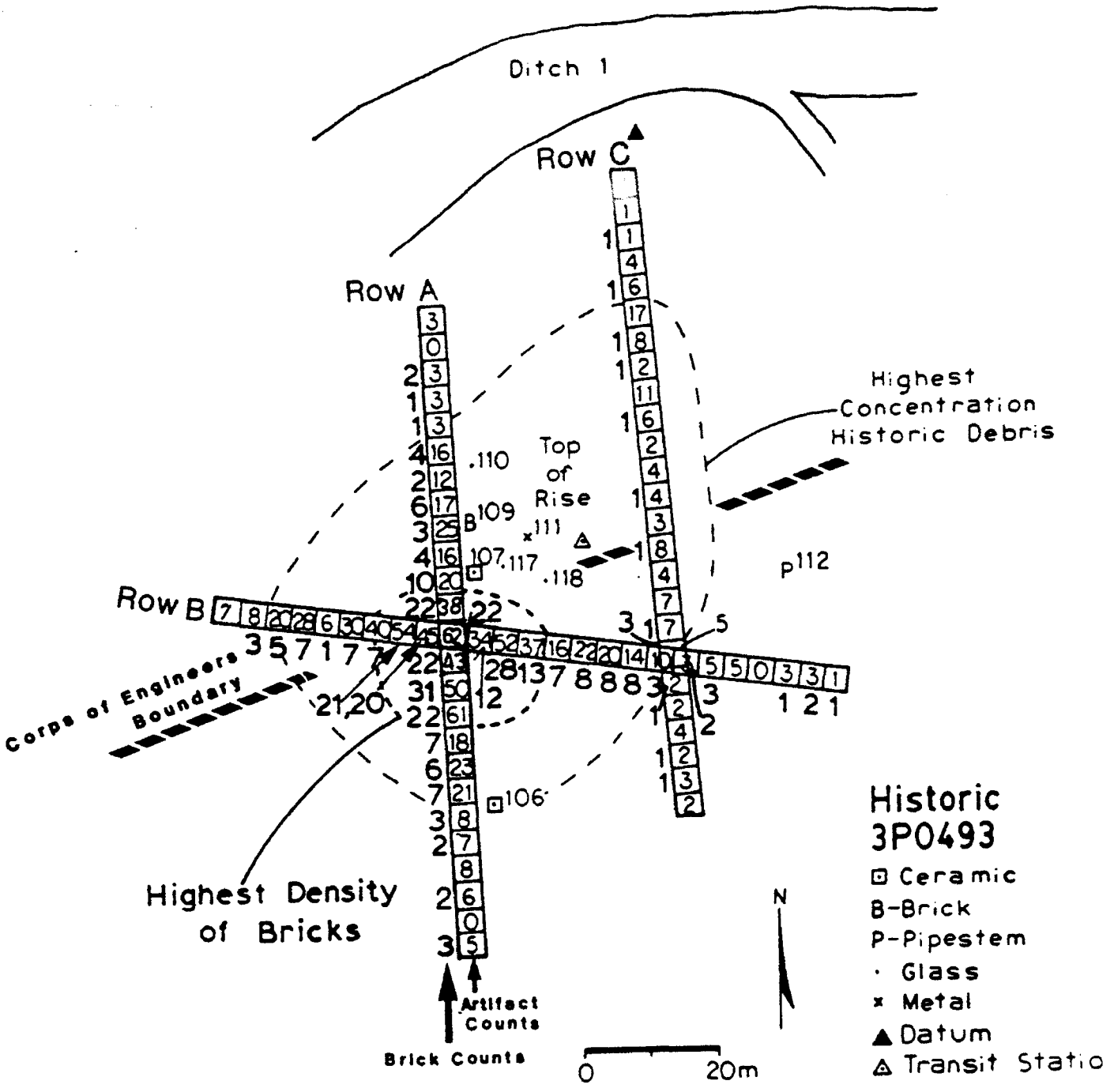


Figure 11. Map of the Historic Component, 3PO493.

given that this field has been repetitively cultivated and that houses of this period were typically built on above ground supports, there is a very low potential for historic features to remain.

Surface Collections

Three rows of 25 units, each measuring 4 m x 4 m, were positioned across the center of the rise in the area with the highest density of artifacts. Counts of the historic artifacts and the location of mapped specimens are shown in Figure 11. A complete listing of the materials collected is presented in Table 14. As can be seen from the distribution of the bricks and the artifacts, the house seems to have been located southwest of the top of the rise. The position of the chimney relative to the structure cannot be determined.

Artifact Descriptions and Interpretations

All of the tableware at 3PO493 was whiteware, not pearlware. Almost all was plain white ironstone, with no painted or impressed decorations. None of the bases had manufacturers' marks, except for an "INA" (FSN 39-10) which probably meant an undiagnostic "CHINA" of some sort. White ironstone was made both in England and the United States, from 1860 until the present day (Ketchum 1983:191). Unmarked bases probably indicate an American origin, as the United States factories hoped to be mistaken for the more prestigious British wares (Ketchum 1983:197). Plain white ironstone was used by both hotels and restaurants and in the home.

Three decorated sherds (FSN 21-11, 36-11, 106-1) from the same plate were found at 3PO493. They are a dark blue handpainted floral design on a hard grayish glaze. This may be a copy of Chinese export, such as many "Flow Blue" designs. This is not a true "Flow Blue," however. It may be a Japanese export, such as the "Wild Turkey" pattern. The grayish color of the glaze is common in Japanese ceramics.

One whiteware sherd from 3PO493 had a green and brown handpainted floral design (FSN 9-3). It came from a set of more expensive dishes than the ordinary ironstone which was common at the site. It could date from 1830 to 1910 or even later. Another sherd had a green leaf design on whiteware.

Stoneware with a light to medium blue and grayish-white glaze was common in the 1890 to 1920 time period. It was made into utilitarian kitchen objects such as salt and butter crocks and pitchers. It was often decorated with impressed designs such as cows, fruit, and swastikas. Two mixing bowl sherds with a blue interior glaze were present at 3PO493.

The stoneware sherds with a brown glaze on the exterior and interior from 3PO493 are probably made with Albany slip. This is a dark brown glaze made of natural clay found near Albany, New

York (Greer 1981:194). Albany slip has been available since the first quarter of the nineteenth century and is still used by potters today. Some of the sherds from 3PO493 show some "pock marks" or pebbling which is typical of salt-glazing. Salt thrown into the kiln vaporizes and covers the pottery with a hard, nearly transparent glaze. Once salt is used in a kiln, traces of it will appear on pottery which has been glazed with another method. One brown glazed handle from 3PO493 is probably from a jug.

Bristol slip glaze is made from chemicals instead of natural materials. It was invented in England in the 1880s (Greer 1981:210). It produces a smooth white glaze. Bristol slip was used by most commercial potters in the United States since the 1890s. It is often combined with brown Albany slip, such as on brown and white jugs. One such sherd showing a Bristol slip base and brown upper body was found at 3PO493.

Two yellowware sherds (FSN 34-8, 35-11) from a mixing bowl were found at 3PO493. One (FSN 34) had two parallel, horizontal, white bands on the exterior as decoration. Yellowware is made with a clear alkaline glaze which enhances the interior yellow color (Ketchum 1983:217). Banded yellowware bowls were made from 1840 to 1940 by many potters.

Several fragments of glazed porcelain doorknobs were present (FSN 35-10, 37-12, 63-5). Such doorknobs were used on Late Victorian and twentieth century houses.

One white-fired, short stemmed, clay pipe sherd was present (FSN 112-1). It had a geometric design on the end of the stem. Such pipes were made in many potteries in North America since the 1830s, and were still being made near Pamplin, Virginia, until 1951 (Hamilton and Hamilton 1972).

Both clear and green window glass was present at 3PO493. Bottles, with one exception, all had seams going up to the top of the neck, indicating a twentieth century date. Various brown and blue glass bottle sherds indicate various medicine and drink bottles. Several green glass sherds appear to be from canning jars. Some of the glass has a purple tint, caused by weathering and aging of impurities in clear glass. Very few decorated glass tableware sherds were present. One clear, pressed glass pattern (FSN 35-7) was found, probably from a bowl. One green jadeite sherd (FSN 55-2) was found, which had a painted metallic rim decoration. One black glass sherd (FSN 55-3) was present. No "Depression Glass" sherds were present at the site, indicating a pre-1925 date.

Objects of metal included nuts, (FSN 7-1, 32-1) both square and round nails, a large round bolt with washer (FSN 17-3), a threaded brass gas fixture (FSN 17-4), a round metal cap (FSN 39-6), a rod (FSN 49-1), and various flat pieces of metal which could be part of a stove were found at 3PO493. One flattened lead bullet (FSN 111-1) and one modern brass and plastic shotgun shell (FSN 64-1) indicate hunting activity.

Fragments of red brick were one of the most common artifacts at 3PO493. Many of these bricks show signs of burning, as though they had been used in a chimney. Tracing the pattern of distribution of bricks sometimes indicates where the chimney fall occurred. Unfortunately, the distribution of bricks at 3PO493 has been much disturbed by plowing and erosion.

Fragments of canning jar lid liners are common at 3PO493. These "porcelain" (white opal glass) liners have fragmentary marks including "PO"(FSN 12-12); "POR"(FSN 14-11); "OYD CA"(FSN 22-8); "UINE POR"(FSN 35-9); and "OYD CAP"(FSN 43-6). These all seem to refer to the Boyd patent lid liner. Lewis Boyd of New York City patented the inner glass liner for the Mason zinc cap on March 30, 1869 (Toulouse 1969:499). The glass lid liner protected the jar contents from acquiring a metallic taste.

The Boyd patent apparently saved the Mason jar from being rejected by consumers. The zinc lid was reuseable, so the jar was relatively inexpensive. Boyd licensed various manufacturers to use his lid liner. However, liners with the mark "GENUINE BOYD MASON CAP" were not manufactured until about 1900, when the Illinois Glass Company of Alton, Illinois, made them (Toulouse 1969:352).

One spongeware sherd (FSN 2-2) is probably from a mixing bowl. It has a brown and yellow sponged exterior and a brown interior. Such spongeware was made in many factories between 1840 and 1910 (Ketchum 1983:212). This kind of decoration is also called "Rockingham" and "Bennington".

Summary

The historic artifacts from 3PO493 all indicate a late nineteenth to early twentieth century date. Both square and round nails are present, but the square nails could be indicative of an heirloom. No pearlware was present. The preponderance of plain whitewares also fits this time period. The canning jar lid liners all were made after 1900. The stoneware includes both salt-glazed and Bristol slip varieties, with Bristol slip dating after the 1880s. The clay pipe could have been made any time after the 1830s up to the 1950s. The glass bottles are all twentieth century with one exception, which has an applied lip. The decorative glassware is pre-Depression glass in color and style. The blue and gray stoneware kitchen ceramics also date to the 1890 to 1920 period. The yellowware was made during a longer time period and is not as diagnostic. The historic component at the Phillips Site (3PO493) which consists of a late nineteenth and early twentieth century house site scatter is confined to the upper disturbed plowzone. Due to the lack of intact deposits and the site's fairly recent antiquity, it is not potentially significant or eligible for nomination to the National Register of Historic Places.

Table 14. Historic Artifacts Collected at 3PO493.

Abbreviations Used: FSN=Field Specimen Number; CR=Crockery; SP=Spongeware; WW=Whiteware; P=Porcelain; T=Transferware; HP=Hand Painted; O=Other Ceramic; SW=Stoneware; WG=Window glass; C=Clear Glass; G=Green Glass; B=Brown Glass; BL=Blue Glass; PR=Purple Glass; MI=Milkglass; M=Marbles; SN=Square nail; RN=Round Cut Nail; O=Other Metal; BR=Brick; O=Other Artifact.

FSN	UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
		CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
7	A3																			1	2		3
8	A4			1							1										1		3
9	A5					1							1								1		3
10	A6			2						2	5	1	1							1	4		16
11	A7									1	4	2	2		1						2		12
12	A8			2	1				1	2	2		2		1						6		17
13	A9			4					2		5	3	5			1			1	1	3		25
14	A10			4	1					2	1		2							1	4		16
15	A11			1						2	4	1	1		1						10		20
16	A12	1		3						1	8		1			1					22	1	38
17	A14			4						4	6	1	2							2	22	2	43
18	A15	1		3					1	4	2	3	1		1	1				1	31	1	50
19	A16			4						9	7	12	1		1	2				1	22	2	61
20	A17			3							3	3	1			1					7		18
21	A18			2		1				1	4	1	4	1	1	1				1	6		23
22	A19			1	1					3	1	1	6		1						7		21
23	A20			1							1	1	2								3		8
24	A21										1	1	2			1					2		7
25	A22										3	2	3										8
26	A23			1							1										2		4
28	A25										1		1								3		5

FSN	UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
		CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
29	B1			2						1	1	1	2										7
30	B2			1							2		1							1	3		8
31	B3			3						1	5	2	4								5		20
32	B4			2							4	3	4	1	1	1				2	7	3	28
33	B5			3						1		1									1		6
34	B6	2		5						4	8		1	1	2						7		30
35	B7			8	1					4	9	2	1							1	7	7	40
36	B8			5					1	1	7	7	7	2		1					21	2	54
37	B9			4						1	3	5	2	3		1	1			1	20	4	45
38	B10			4	2						13	8	5			2				1	2	22	3	62
39	B11			4						2		8		1		1					3	12	3	34
40	B12			2						1	3	9	6	1			2					28		52
41	B13			4	1					1	9	4	4									13	1	37
42	B14			1						2		2	3									7	1	16
43	B15			1							4	6	1									8	2	22
44	B16			2	1						2		2			3						8	2	20
45	B17			2							1	2								1		8		14

Table 14. (Continued)

FSN	UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
		CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
46	B18									1	1	3	1							1	3		10
47	B19										1										2		3
48	B20									1			1								3		5
49	B23									1										1	1		3
50	B24											1									2		3
51	B25																				1		1
52	C1																					1	1
53	C2										1												1
54	C3																				1		1
55	C4			1								1	1									1	4
56	C5									1	4										1		6
57	C6									3	12		1									1	17
58	C7				1					1	2		1								1	2	8
59	C8										1										1		2
60	C9								3		5					1				1		1	11
61	C10						1				2									1	1	1	6
62	C11																			2			2
63	C12										2	1										1	4
64	C13									1	1										1	1	4
65	C14										1		1		1								3

FSN	UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
		CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
66	C15			3					1		2		1								1		8
67	C16									2	1		1										4
68	C17			1							4				1							1	7
69	C18			1					1	2	2										1		7
70	C19									1	1										3		5
71	C20			1																	1		2
72	C21			1																		1	2
73	C22			2						2													4
74	C23														1						1		2
75	C24												1							1	1		3
76	C25			1											1								2

FSN	UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
		CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
2	SURF		1														1					1	3
106	SURF																					1	1
107	SURF									1													1
109	SURF																				1		1
110	SURF											1											1
111	SURF																			1			1
112	SURF									1													1
117	SURF											1											1
118	SURF										1												1

TOTAL

UNIT	CERAMICS							SW	WG	GLASS							METAL			BR	O	TOTAL
	CR	SP	WW	P	T	HP	O			C	G	B	BL	PR	MI	M	SN	RN	O			
	4	1	100	9		3	2			191	72	3	22	13	1		1	1		364		
								18	87		83									28		47	1,050

SEDIMENTOLOGICAL CHARACTERISTICS

AND THE ORIGIN OF FLUVIAL SEDIMENTS

by John C. Dixon

Methods

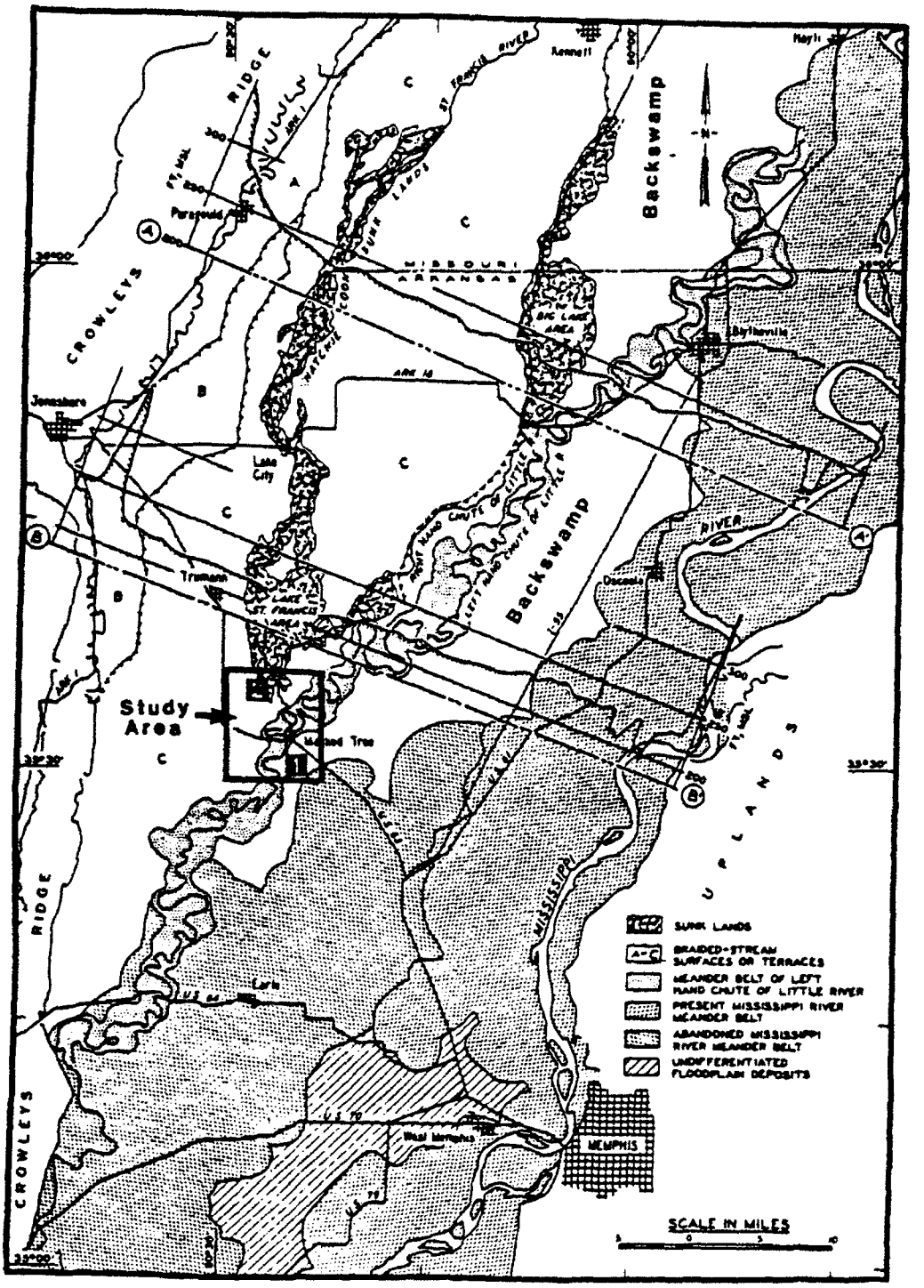
Grain Size Analysis

Sediment samples from one archeological site and two sediment cores in the study area were collected for sedimentological analysis in the laboratory (Figure 12). The sediments were sampled at approximately 10 cm intervals from visually identifiable horizons in one archeological test pit. Samples from the cores were taken from visually identifiable lithologic horizons.

Approximatly 30 grams of air dried sediment from each horizon sampled were disaggregated, dried, and weighed to determine initial sample weight. Each sample was then aggitated in a blender for five minutes to obtain complete particle suspension. The suspended sample was then washed through a 230 mesh screen with distilled water, and the sand fraction (0.06-2.00 mm) removed. This fraction was later dry sieved and the relative amounts of very coarse, coarse, medium, fine, and very fine sand determined. The silt and clay size fractions (<0.06 mm) were transferred to a 1,000 ml cylinder, with 25 ml of Calgon in the 1,000 ml of distilled water. Each sample was stirred, and samples of the suspended sediment were drawn off at the appropriate depths and times to determine the relative abundances of several silt fractions and the clay fraction. In addition the total sand, silt, and clay content was determined. These analyses were performed at the University of Arkansas Textural Analysis Laboratory in Fayetteville.

Radiocarbon Dating

Samples for radiocarbon dating were taken from both Cores 1 and 2 and sent to Beta Analytic Inc. for age determinations. Considerable thicknesses of sediment from the cores were analysed because of the very low organic matter content of the sediments. In all cases, approximatly 70 cm of core sediment was analysed. Sediments were pretreated with a sequence of weak acid solutions to remove non-contemporaneous groundwater carbonates. The sediment was washed of all acids and gently dried. Organic carbon was then dated using standard counting precedures. One of the samples was counted for quadruple normal counting time because of its great age and the need to reduce the attendant high statistical counting error (Beta Analytic Inc. written



1 Core 1 and Site 5

2 Core 2

Figure 12. Geomorphic Map of the Study Area Showing Sample Locations (base map from Saucier 1970).

communication). One other sample could not be processed using standard procedures because of the extremely low carbon content (.17 g) and is being retained by Beta Analytic Inc. until it can be counted using an experimental technique which is currently being tested.

Sedimentological Characteristics

Site 5

Site 5 is located near the confluence of Ditch 1 with the St. Francis River in southern Poinsett County (Figure 12). The sediment in the uppermost 25 cm of the test unit consists of a very dark grayish brown (10YR3/2) sandy loam with massive structure and a gradational lower boundary. The sediment is dominated by fine sand, with substantially smaller, but similar abundances of coarse, medium, and very fine sand fractions (Table 15). The silt fraction is dominated by coarse silt with abundances of medium and fine silt of less than 5%. Clay is the second most abundant grain size fraction of the sediment. A radiocarbon date of 970 $\pm$ 170 years B.P. was obtained from small fragments of wood charcoal collected from 15-25 cm.

From 25-75 cm the sediment consists of very dark gray (10YR3/1) loam with massive structure with a gradational lower boundary. From 50-75 cm the sediment is a dark brown (10YR3.5/3) loam. The sediment is dominated by coarse silt, with approximately 20% clay (Table 15). Finer silt fractions are present in abundances of less than 10%. The sand fraction is dominated by fine to very fine sands, with abundances of other sand fractions generally less than 10%. A radiocarbon date of 900 $\pm$ 90 years B.P. was obtained from small wood charcoal fragments collected from 25-35 cm, and a date of 520 $\pm$ 70 years B.P. was obtained from a single large fragment of wood collected from 35-45 cm.

From 75 cm to the bottom of the test unit at 90 cm below the ground surface, the sediment is a dark brown (10YR3.5/3) silt loam with massive structure. The sediment is dominated by coarse silt with clay being the next most abundant grain size fraction (Table 15). The sand fractions are present in abundances of less than 10%, generally less than 5%.

These sediments are interpreted on the basis of their grain size distributions to be natural levee deposits dominated by coarse silt and fine to very fine sands. The sediments are believed to be associated with the St. Francis River when it occupied the now abandoned Horseshoe Lake channel. Detailed grain size data with graphical representations are presented in Table 15.

Core 1

Core 1 was sunk to a depth of 10 meters in an abandoned meander bend of the St. Francis River in southern Poinsett County (Figure 12). The uppermost 68 cm of the core (136-204 cm below ground surface) consists of a very dark grayish brown (10YR3/2)

MARKED TREE SITE 5

SAMPLE	HORIZON	TOTAL			GRAVEL	SAND					SILT			CLAY
		SAND	SILT	CLAY		VC	C	M	F	VF	C	M	F	
0587-1	0 - 15	62	20	17	0	0	12	15	22	14	14	4	2	17
0587-2	25 - 35	47	34	20	0	0	4	9	18	16	24	7	3	20
0587-3	45 - 55	46	36	19	0	0	8	11	12	15	26	7	3	19
0587-4	65 - 75	32	49	19	0	0	5	9	8	11	33	13	3	19
0587-5	85 - 95	25	58	17	0	0	2	4	6	13	44	12	2	17

PERCENT ERROR

0587-1= 2.50525368
0587-2= 2.90367147
0587-3= 3.35638811
0587-4= .680967079
0587-5= 4.81968506

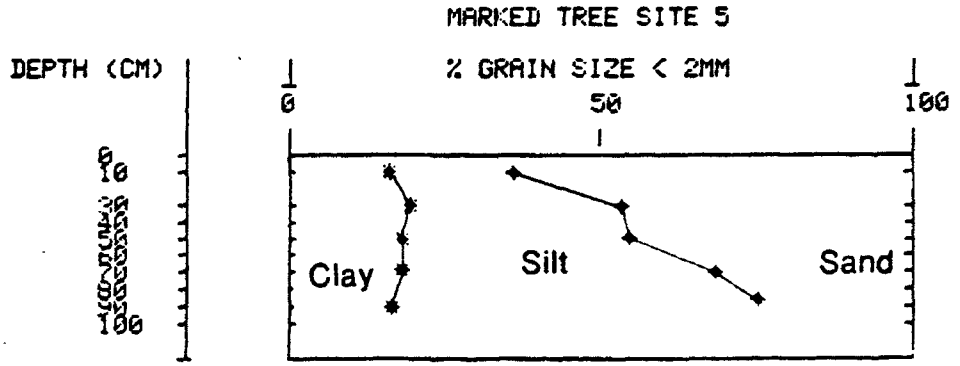
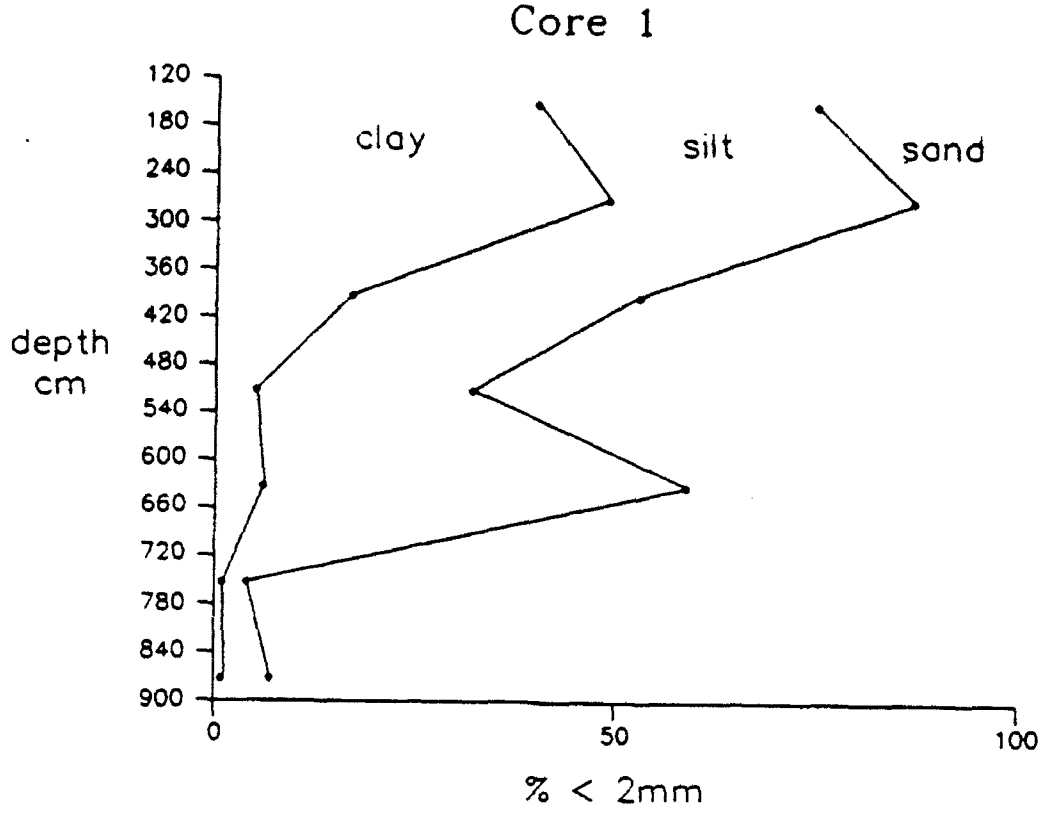


Table 15. Soil Textures and Grain Size Analysis from Site 5.

ground surface) consists of a very dark grayish brown (10YR3/2) clay/clay loam with massive structure and gradational lower boundary. From 204-272 cm below the ground surface, the sediment is also very fine, consisting of very dark grayish brown (10YR3/2) clay with massive structure and a gradational lower boundary. These two uppermost sedimentary units are dominated by clay, with medium silt being subdominant (Table 16). Sand fractions are present in exceedingly small amounts, as is coarse silt. These two uppermost units are interpreted to be clay plugs deposited in slackwater at the edge of the channel of the abandoned meander loop.

From 272-340 cm, the sediment consists of a very dark grayish brown (10YR3/2) loam with massive structure and a gradational lower boundary. Texturally, this loam is dominated by fine sand. Smaller abundances of clay and medium and coarse silt are present. Medium and very fine sands are present in abundances of 10% or less, with no coarse sand being present. A whole soil radiocarbon date of 6,660 $\pm$ 170 years B.P. has been obtained for this unit. From 340-408 cm is a dark gray (10YR4/1) silt loam with moderate fine subangular blocky structure, with a clear lower boundary. This unit is dominated by fine sand with slightly smaller and similar amounts of medium and very fine sand and coarse silt. Finer silt fractions and clay are present in abundances of 5% or less. Coarser sand fractions are absent. The fine grained unit retrieved from the core at 408-476 cm consists of a dark gray (10YR4/1) silt loam with massive structure and a sharp lower contact. The silt loam is dominated by coarse silt, with very fine sand being subdominant. Finer silt fractions are present in abundances of 5% or less, and medium and fine sand are present in abundances of 10% or less. The sediment contains 6% clay, and no coarser sand fractions. Together, these three fine grained units are interpreted to be the result of progressive abandonment of the channel by the Left Hand Chute of the Little River. The sediments display a crude upward fining in their texture, which is characteristic of sediments deposited in a progressively shallowing channel. Alternatively, the deposits may be associated with a natural levee of the Mississippi River. However, the former interpretation is preferred.

The remainder of the core below 476 cm consists of grayish brown (10YR5/2) sand with granular structure. These sediments are dominated by fine sand with medium sand being sub-dominant. With the exception of the very fine sand, which is present in an abundance of 8%, none of the other grain size fractions exceed 5% in their abundance. These sandy sediments are interpreted as crevasse channel deposits which have subsequently been covered by natural levee deposits. Crevasse channel deposits are sediments deposited during flood episodes when a meandering stream breaches a natural levee. Detailed grain size analyses and their graphical representation are presented in Table 16.



SAMPLE	HORIZON cm	TOTAL			GRAVEL	SAND					SILT			CLAY
		SAND	SILT	CLAY		VC	C	M	F	VF	C	M	F	
1-1	136-204	25	35	40	1	6	8	7	3	1	7	20	8	40
1-2	204-272	13	38	49	0	1	2	1	3	6	2	21	15	49
1-3	272-340	47	36	17	0	0	0	10	31	6	20	13	3	17
1-4	340-408	68	27	5	0	0	1	21	29	18	24	3	0	5
1-5	408-476	42	53	6	0	0	0	4	10	28	47	5	1	6
1-6	476-544	97	3	1	0	0	0	25	67	5	2	1	0	1
1-7	544-952	94	6	1	0	0	1	24	61	8	4	2	0	1

PERCENT ERROR

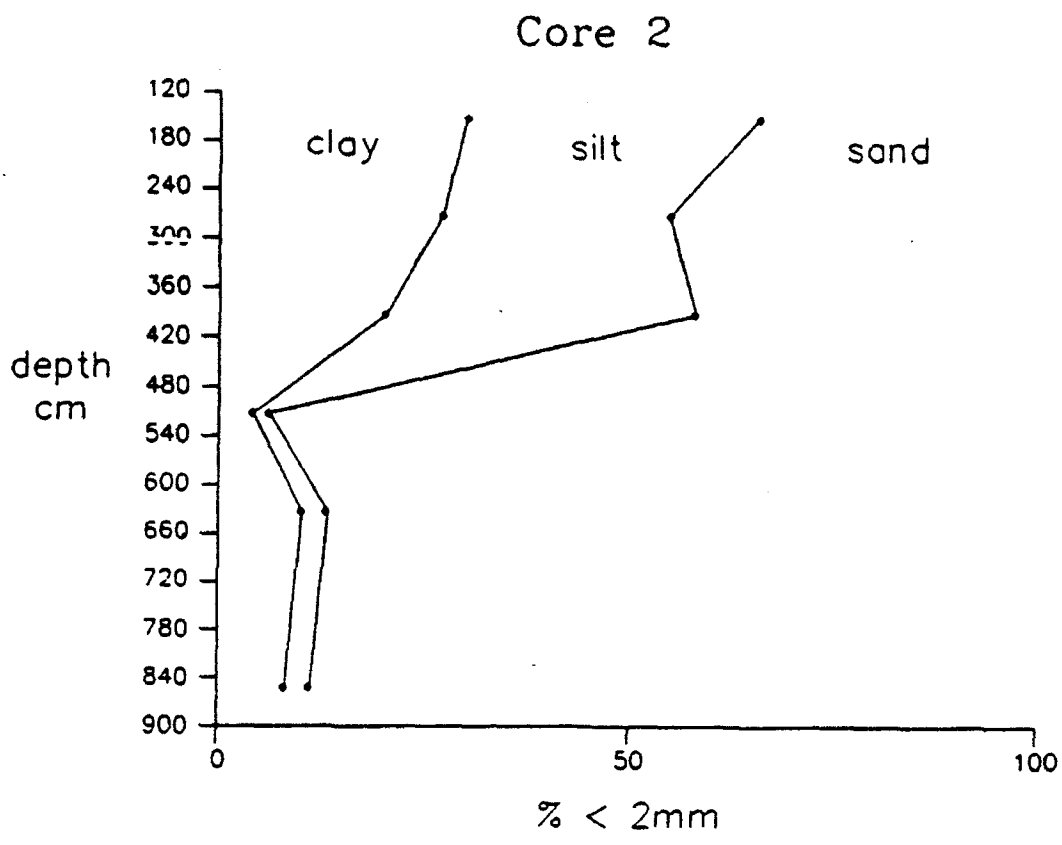
1-1= 1.17528662
1-2= 6.57281156
1-3= 2.73592327
1-4= 6.10510584
1-5= 4.95969152
1-6= 1.89843702
1-7= 1.95221101

Table 16. Soil Textures and Grain Size Analysis of Core 1.

Core 2

Core 2 was sunk to a depth of a little over 7 meters at the southern end of the St. Francis Sunken Lands State Wildlife Management Area (Figure 12). The uppermost 68 cm of the core (136-204 cm below the ground surface) consists of grayish brown (10YR5/2) clay loam with dark yellowish brown (10YR4/4) mottles. Some portion of this upper unit may have been disturbed by recent construction of a nearby dam. The sediment is massive in structure with a gradational lower boundary. This sediment is dominated by clay with smaller, but similar, abundances of coarse silt and fine sand. The silt fraction consists of substantially smaller abundances of medium and fine silt. The sand fraction consists of small amounts of very fine, medium, and coarse sand. From 204-272 cm the sediment in the core consists of dark grayish brown (10YR4/2) sandy clay loam with dark yellowish brown (10YR4/4) mottles. The structure of the sediment is weak, fine, subangular blocky with a gradational lower boundary. This sediment is co-dominated by clay and fine sand. The silt fraction is dominated by coarse silt, with substantially smaller abundances of medium and fine silt. There are very small abundances of medium and coarser sand fractions. From 272-340 cm the sediment is a very dark gray (10YR3/1) loam with massive structure and an abrupt lower boundary. The sediment is dominated by very fine sand, with smaller but equal amounts of coarse silt and clay. The finer silt fractions range from 5%-9%, while coarser sand fractions are absent or never reach 10%. These fine grained sediments are, on the basis of their grain size distributions, interpreted to be channel fill deposits (Selley 1982).

From 340 cm to the base of the core, the sediment displays a marked coarsening. A fine-medium sand unit that occurs from 340-408 cm is dark grayish brown (10YR4/2) in color and possesses granular structure. The lower boundary of this unit is clear. The sediment is dominated by fine sand with subdominant amounts of medium sand. Very fine sand is present in an abundance of 11%. All other size fractions occur in abundances of less than 5%. Beneath the fine-medium sand unit from 408-470 cm is a slightly finer loamy sand, which is grayish brown (10YR5/2) in color and possesses granular structure. The lower boundary of this unit is gradational. The sediment is dominated by fine sand, with medium sand being subdominant. All other grain size fractions occur in abundances of 10% or less. From 470 cm to the base of the core the sediment consists of a grayish brown (10YR5/2) sand. Medium sand is present in the sediment in an abundance of just over 20%. All other size fractions are present in abundances of less than 10%. The sandy sediments revealed in the base of the core are interpreted on the basis of their grain size distributions to be braided stream sediments (Selley 1982). A charcoal in radiocarbon date of 31,250 $\pm$ 840 years B.P. was obtained from the lowest stratum in the core. Detailed grain size analyses and their graphical representation are presented in Table 17.



SAMPLE	HORIZON cm	TOTAL			GRAVEL	SAND					SILT			CLAY
		SAND	SILT	CLAY		VC	C	M	F	VF	C	M	F	
2-1	136-204	35	36	30	1	0	1	7	19	7	120	12	4	30
2-2	204-340	46	28	27	1	1	1	7	26	11	120	6	2	27
2-3	340-408	42	38	20	0	0	0	1	9	32	120	13	5	20
2-4	408-476	93	2	4	0	0	4	34	44	11	2	0	0	4
2-5	476-544	87	3	10	0	0	1	15	63	7	2	1	0	10
2-6	544-768	89	3	8	0	0	0	22	62	4	2	0	1	8

PERCENT ERROR

2-2= 4.28828534
2-3= 5.272797
2-4= 3.29095449
2-5= 8.03508101
2-6= 6.81859088
2-1= 3.09083561

Table 17. Soil Textures and Grain Size Analysis of Core 2.

Discussion

Geomorphic History

The Ditch 1 study area is located adjacent to the boundary between the braided stream terrace level and the meandering stream level of the eastern lowlands of the lower Mississippi River Valley (Figure 12). The braided stream terrace level consists of a number of terraces or levels which become progressively younger in an easterly direction (Morse 1969). The terraces consist primarily of sandy braided stream sediments which are mantled in places by channel fill, natural levee, backswamp deposits, and loess (West et al. 1980). Sediments of the braided stream terraces were derived from the Mississippi River when it occupied a more westerly location than at present. Traversing the braided stream terraces, and oriented in a NE-SW direction, are abandoned stream channels which have been infilled with fine grained fluvial sediments.

To the east of the braided stream level lies the meandering stream level. In contrast to the braided stream terrace sediments, the sediments of the meandering stream level are dominated by fine-grained deposits. These deposits consist primarily of natural levee and backswamp deposits from both the Mississippi River and the Left Hand Chute of Little River. Natural levee deposits from the Left Hand Chute of Little River dominate the western part of the meandering stream level.

The braided stream deposits are the oldest deposit in the study area. Until now, no absolute ages had been obtained for these sediments, as the high energy environment represented by these sediments are generally not conducive to the preservation of C-14 datable materials. Guccione (1987) suggested that the braided stream sediment was probably between 25,700 and 12,500 years B.P. on the basis of dates from the Peoria Loess (McKay 1979; Miller et al. 1984) which is stratigraphically above the braided stream deposits. From radiocarbon dates obtained by Guccione (1987) from Big Lake just to the east of the braided stream terrace surface in Mississippi County, an age of greater than 9,050 years B.P. has been suggested. The oldest terraces in the eastern lowlands are probably as old as 22,000 years B.P. as they are mantled by Peoria loess of this age (McKay 1979). The lower terraces are probably about 6,000 years old (Saucier 1981). As part of this present study, a date of 31,250 $\pm$ 840 years B.P. has been obtained from organic debris in braided stream deposits from the bottom of a core sunk in the southern end of the St. Francis Sunken Lands (Figure 12). From this date, it appears that Guccione's (1987) age estimate of 12,500-25,700 years B.P. was a reasonable estimate while Saucier's (1981) estimate is too young. However, the date obtained from this present study may have been derived from transported organic debris and may, therefore, be giving an inflated age for the braided stream deposits.

Channel fill deposits occur in abandoned braided stream channels. These channel fill deposits are generally very dark gray brown in color and are fine grained in texture. No absolute ages are yet available for these deposits. Guccione (1987) has suggested that these sediments are probably younger than 180 years based on a C-14 date obtained from similar sediments in Big Lake by King (1980).

The meandering stream level of the eastern lowlands consists of sediment deposited in a variety of depositional environments. These environments include stream channel beds, channel fills, point bars, natural levees, crevasse channel deposits and backswamps. However, only three of these environments are represented by sediments examined in this study.

The fine sandy sediment at the base of Core 1, from an abandoned meander loop of the Left Hand Chute of Little River, is interpreted to be crevasse channel deposits. These deposits represent sediment deposited during flood events when a meandering stream breaches the natural levee. Alternatively these deposits could be associated with a terrace of the Mississippi River into which subsequent cutting has occurred followed by subsequent deposition. The former interpretation, however, is preferred. No age was obtained for this deposit; however, similar deposits in a similar stratigraphic position at the northern end of the Left Hand Chute of Little River (Pemiscot Bayou) have been dated by Guccione (1987) at 8,530 $\pm$ 300 years B.P. A similar age for these in Core 1 of this study appears reasonable, especially given the age of the natural levee deposits immediately above the sandy sediments.

Immediately above the crevasse channel deposits revealed in the Core 1 sediments is a thick unit of channel fill deposits. The upper part of this deposit has been dated at 6,660 $\pm$ 170 years B.P., and presumably represents deposition associated with progressive channel abandonment. This date corresponds to the estimated age of buried natural levee deposits from Pemiscot Bayou in the northern part of Mississippi County adjacent to the contemporary channel of the Mississippi River (Guccione 1987).

Substantially younger natural levee deposits occur adjacent to the present meander belt of the Left Hand Chute of Little River and the St. Francis River. Natural levee deposits presently exposed at the ground surface contain archeological artifacts that are Mississippian in age (about 900-1,000 years B.P.).

The youngest deposits in the study area are the clay plugs of the abandoned meander loops of the Left Hand Chute of Little River. Clay plug deposits are represented in the uppermost 136 cm of Core 1. These sediments occur in a meander loop that was abandoned in 1847. Archeological evidence suggests that these deposits are approximately 1,000 years old. Guccione (1987) has suggested a similar age for channel fill deposits from Pemiscot

Bayou Core in the northern reaches of the Left Hand Chute of Little River in northern Mississippi County.

Archeological Significances

A variety of geomorphic environments occur in the vicinity of Ditch 1 which are likely to represent probable locations of archeological sites. In some of these settings, there is a strong likelihood of deeply buried sites.

The most likely geomorphic setting for the occurrence of buried archeological sites is within the meander belt of the Left Hand Chute of Little River. The major archeological site identified in this study occurs in association with sediments which were determined to be associated with natural levee deposition. Deposition in this geomorphic setting is discontinuous or episodic in nature, with periods of time when protection from flooding was afforded. Consequently, intermittent occupation of such sites is likely. Occupation of the natural levee site identified in this study occurred about 900-1,000 years B.P.; however, radiocarbon dates from a deep core near the archeological site suggest that natural levee sedimentation has been occurring since about 6,660 years B.P. Therefore, buried archeological sites are highly likely.

Abandoned stream channels are common on the floodplain, and their margins represent potential sites of occupation. However, many if not most of these are historical features that post date modern settlement. Nonetheless, beneath the clay plugs of the oxbows are thick buried sequences of natural levee deposits which are locations for buried archeological sites.

As discussed previously, the Ditch 1 area is at the contact between the braided stream terrace surface, which represents Mississippi River deposition prior to about 8,000 years B.P., and the younger meandering channel surface. In general, it is unlikely that archeological sites are to be found buried within the sediments of the older landscape. Radiocarbon dating from this present study indicates that portions of the coarse, braided stream sediments are as much as 31,000 years old. One exception to this, however, is where the braided stream sediments have been covered by younger fluvial and/or lacustrine sediments. Backswamp and natural levee sediment associated with fluvial processes since deposition of the braided stream sediments are likely locations for buried archeological sites. Such environments occur in the floodplain regions of the St. Francis River and the Right Hand Chute of Little River and their associated sunklands.

POLLEN ANALYSES FROM CORES TAKEN ON THE ST. FRANCIS RIVER AND IN THE ST. FRANCIS SUNKEN LANDS

by Linda Scott Cummings

Introduction

Pollen analysis of two cores from the St. Francis River and the St. Francis Sunken Lands in Poinsett County, Arkansas, was directed toward identification of paleoenvironmental conditions. Cores were collected by project geomorphologist, Dr. John C. Dixon, for pollen and geomorphic analysis. The cores represent sediments of early Holocene and perhaps very late Pleistocene age at their base. A listing of scientific and common names of the pollen types observed or referred to in this discussion is presented in Table 18.

Methods

The pollen was extracted from soil samples from northeastern Arkansas submitted by SPEARS to Palynological Analysts, an Archaeobiological Laboratory. A chemical extraction technique based on flotation is the standard preparation technique used in the Palynological Analysts laboratory for the removal of the pollen from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extraction of pollen from soils where preservation has been less than ideal and pollen density is low.

Hydrochloric acid (10%) was used to remove calcium carbonates present in the soil, after which the samples were screened through 150 micron mesh. Zinc bromide (density 2.0) was used for the flotation process. All samples received a short (10 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The samples were then acetolated for 3 minutes to remove any extraneous organic matter.

A light microscope was used to count the pollen to a total of 100 to 200 pollen grains at a magnification of 430x. Pollen preservation in these samples varied from good to poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible.

The category "Juniperus/Taxodium" pollen encompasses both genera, since broken and crushed Taxodium pollen cannot be

Scientific Name	Common Name
ARBOREAL POLLEN:	
Acer	Maple
Alnus	Alder
Betulaceae	Birch or hazel family
Carya	Hickory
Celtis	Hackberry
Juglans	Walnut
Juniperus	Juniper
Taxodium	Cypress
Liquidambar	Sweet gum
Nyssa	Black gum, tupelo gum
Picea	Spruce
Pinus	Pine
Quercus	Oak
Salix	Willow
Tilia	Basswood
Ulmus	Elm
NON-ARBOREAL POLLEN:	
Apocynum	Indian hemp, Dogbane
Caryophyllaceae	Pink family
Cheno-ams	Includes amaranth and pigweed family
Compositae:	Sunflower family
Artemisia	Sagebrush, wormwood
Low-spine	Includes ragweed, marsh-elder, cocklebur, etc.
High-spine	Includes aster, sunflower, etc.
Liguliflorae	Includes dandelion and chickory
Cruciferae	Mustard family
Cyperaceae	Sedge family
Ephedra	Mormon tea
Euphorbiaceae	Spurge family
Gramineae	Grass family
Labiatae	Mint family
Leguminosae	Pea family
Liliaceae	Lily family
Nyctaginaceae	Four o'clock family
Polemoniaceae	Phlox
Potamogeton	Pondweed
Rhamnaceae	Buckthorn family
Rosaceae	Rose family
Sagittaria	Arrowroot
Saxifragaceae	Saxifrage family
Solanaceae	Potato/tomato family
Typha	Cattail/Bur-reed
Umbelliferae	Parsley/carrot family
NONPOLLEN:	
Bottryococcus	
Isoetes	Quillwort
Polypodiaceae	Fern family

Table 18. Scientific and Common Names of the Pollen Types Observed.

distinguished from Juniperus pollen. No clear exit papilla (Kapp 1969) were observed on any of the grains, although cypress is recorded in the present vegetation at Big Lake, and was recovered in small quantities in other samples analyzed by James King from the past 180 years at Big Lake (King 1980). He, also, notes that Taxodium may be present in his Juniperus pollen category due to the similarity of the pollen grains morphologically, and the fact that many grains were broken and crushed. Many of the pollen grains from both Big Lake and Pemiscot Bayou were crushed and broken, and in a relatively poor state of preservation (Scott and Aasen 1987).

Due to the abundance of Isoetes microspores in some of these core sediments, this taxa was excluded from the total pollen sum. The frequency of Isoetes was calculated separately on the same base as the pollen sum.

Pollen aggregates were recorded during identification of the pollen. Aggregates are clumps of a single type of pollen, and may be interpreted to represent pollen dispersal over short distances. Aggregates were included in the pollen counts as single grains, as is customary. The presence of aggregates is noted by an "A" next to the pollen frequency on the pollen diagram.

Discussion

Arkansas is included in the Southern Floodplain Forest Section of the Southeastern Mixed Forest Province. Relief includes gentle slopes on otherwise flat plains and piedmont. Streams are generally sluggish, and marshes, lakes, and swamps are numerous.

Most of the southern Atlantic and Gulf coastal states, of which Arkansas is one, enjoy a basically subtropical climate. High humidity is characteristic of this area, particularly in the summer, as in the absence of really cold winters (Bailey 1980:22-25). Rainfall appears to be fairly evenly distributed throughout the year, although peaks occur in mid-summer or early spring when most of the rain falls in thunderstorms. Although precipitation exceeds evaporation, summer droughts may occur.

Southern Mixed Forest comprises approximately one third of the eastern half of Arkansas. Oak and pine are noted to dominate in the southern portion of the state (Davis 1983:166). Much of the eastern United States was largely a region of deciduous forest at the time of European settlement.

The southeastern United States is thought to have served as the principle proglacial refuge for plant and animal taxa that recolonized deglaciated landscapes during interglacial times. The Southeast contains a diversity of physiographic regions and plant communities, richness of woody and herbaceous plants, and a large number of endemic plant species (Delcourt and Delcourt 1985:1). Lake and bog environments thought to be suitable for

plant fossil preservation were considered to be extremely scarce south of the glacial margin; the only exceptions being the "Carolina Bay" lakes along the Atlantic coastal plains (Buell 1939, 1945a, 1945b, 1946) and the karst ponds in the lake districts of Florida, where early palynological research was focused. Early research outside these two regions focused initially on coastal peat deposits (Davis 1946), river terrace deposits with organic lenses associated with Pleistocene megafaunal assemblages (Brown 1938), or preliminary analysis of isolated peat bogs (Sears and Couch 1932; Sears 1935; Potzger and Tharp 1943, 1947). All of these studies have allowed broad patterns of late Quaternary vegetational and climatic change for the Southeast to be reconstructed (Delcourt and Delcourt 1985:2; Whitehead 1973; Davis 1976, 1981, 1983; Delcourt and Delcourt 1979, 1981, 1983, 1984a, 1984b).

Numerous pollen studies document the movement of vegetation across the Southeast during the Quaternary period. By 16,500 B.P., climatic amelioration following the full-glacial had already begun at sites located near the southern boundary of the boreal forest. A decline in the dominance of diploxylon pine accompanied increasing populations of more mesic boreal and cool deciduous taxa (Delcourt and Delcourt 1985:18). Spruce and fir frequencies increased during the Late Wisconsin late-glacial interval (16,500 to 12,500 B.P.). Delcourt and Delcourt (1985) interpret the expansion of Picea and Abies to indicate cool climatic conditions and increased precipitation during the summer growing season. On the uplands adjacent to the Lower Mississippi Alluvial Valley, cool temperate deciduous trees increased during the late-glacial and warm temperate taxa began a northward migration (Delcourt et al. 1980). As the climate became warm during the transition between the full-glacial and late-glacial, deciduous trees within Alabama, Georgia, and South Carolina moved from their glacial refuges and migrated northward. Later, the transition between the Pleistocene and Holocene (12,500 B.P.) is marked by a change in dominance from boreal to temperate plant communities. Toward the end of this interval, oak (Quercus) and hickory (Carya) expanded to accomodate the increasing mean temperatures and the extended growing season. Boreal species could no longer tolerate the ameliorating climatic conditions.

During the Early Holocene Interval (12,500 to 8,500 B.P.), cool temperate mesic trees continued their northward expansion throughout the mid-latitude southeastern United States. However, early Holocene forests were different in composition and major dominants than those of the later Holocene (Delcourt and Delcourt 1985:19). By 10,000 years ago pine and spruce forests were replaced by deciduous forests of white pine, hemlock, and beech (Whitehead, 1981). Pollen records from sites that span the 12,500 to 8,500 year period (Anderson Pond, White Pond, Cahaba Pond) show that Ostrya/Carpinus dominated the pollen spectra (Delcourt 1979). At Cahaba Pond, beech pollen dominated along with a significant amount of hornbeam, oak, hickory, elm, and ash between 12,000 and 10,200 (Delcourt et al. 1983). Different from the forests of today, species of mixed coniferous and broadleaf

deciduous occurred together. Bald cypress (Taxodim distichum), a coastal species, extended inland during this time period, while white pine (Pinus strobus) and hemlock (Tsuga) ranged southward of their present extent into central Alabama. Late Wisconsin forests in Tennessee contained ironwood which contributed 20% of the arboreal pollen between 12,500 and 9,000 years ago (Davis 1983: 172). Delcourt (1979) interprets the larger frequencies of ironwood pollen between 12,000 and 9,000 years ago as evidence for mesic conditions relative to the present climate of Tennessee. Other arboreal contributors included spruce, oak, hickory, sugar maple, white ash, elm, fir, and many mesic taxa. Pine pollen, however, is absent. This forest was replaced 9,000 years ago by a xeric assemblage dominated by oak and sweet gum (Delcourt 1979). Farther north in the West Virginian Mountains, deciduous forest had expanded by 12,000 years ago (Watts 1979). Oak, hemlock, and hickory replaced spruce and pine in the valleys of Virginia (Craig 1969).

Modern floristic regions developed in the late and middle Holocene as conditions changed from cool-temperate to warm-temperate. The Prairie expanded eastward in the midwestern United States during the Middle Holocene Interval (8,500 to 4,000 B.P.). Mesic forests were replaced by a xeric woodland of oak and pine approximately 5,000 B.P. This warmer and drier Hypsithermal interval was witnessed in the mid-latitudes of the Southeast west of the Appalachians as well. Forest communities in Tennessee became xeric during this interval (Delcourt 1979). A warm and wet climate was evidenced in the southern Appalachian Mountains and Gulf Coastal Plain. Coastal Plain taxa favoring wetland environments inhabited sag ponds in the Ridge and Valley of central Alabama (Delcourt et al. 1983) and northwestern Georgia (Watts 1970). By 6,500 B.P., pollen evidence indicates that Coastal Plain species had migrated to Cades Cove, east Tennessee during a warm and wet interval. The diversity of species within the Great Smoky Mountains regions reflects the mingling of elements of alpine tundra, boreal forest, deciduous forest, and evergreen forest, and the location of relict habitats of these species during the Quaternary.

The dominant species of the Southern Evergreen Forest shifted during middle Holocene. By 5,000 B.P., forests once dominated by xeric oak and hickory species were replaced by southern pine species (Delcourt 1980; Watts 1969, 1975; Watts and Stuiver 1980; Davis 1983). Even in Tennessee where pine was never abundant, pine pollen frequencies increase (Davis 1983:179). Delcourt and Delcourt (1985) attribute this shift to pine as a result of the strengthening of the Tropical Airmass, intensification of hurricane frequency, and an increase in fire frequency. The Southeastern Evergreen Forest remained intact on the upland interfluves of the Gulf Coastal Plain during the transition between the last glacial/interglacial cycle. Changes in the forest composition reflect changes in effective precipitation and fire frequency during this interval.

During the Late Holocene Interval (4,000 B.P. to the present), spruce and fir expanded locally at mid and high elevations in the central and southern Appalachian Mountains as a result of minor cooling conditions (Barclay 1957; Watts 1979; Shafer 1984; Delcourt and Delcourt 1984a, 1985; Delcourt 1985; Davis 1983). Davis (1983) attributes this boreal expansion to a cooling episode as well, although she notes the time of this occurrence varies between 5,000 and 1,000 B.P. depending on the particular section of the Southeast examined. Meanwhile, American chestnut (Castanea dentata) expanded northward and increased in abundance in the southern and central Appalachians (Delcourt and Delcourt 1981). Today, extensive Appalachian oak-chestnut forest are the result. Also in the late Holocene, shortleaf pine (Pinus echinata) migrated northward and expanded its range into the Ozarks of Missouri and eastern Oklahoma (Albert and Wykoff 1981; Smith 1984). Pocosin wetlands filled in the Carolina Bays along the Atlantic coastal plain (Whitehead 1965, 1973, 1981), and coastal swamps expanded (Spackman et al. 1966; Whitehead and Oaks 1979; Cohen et al. 1984).

The impact of the American Indian on native vegetation has also been noted in late Holocene pollen records from the Southeast. Occasional pollen representing cultigens have been recovered. Large Low-spine Compositae frequencies, Cheno-am, Portulacaceae, Plantago spp., and Rumex indicated that areas of disturbed ground occurred at Tuskegee Pond, and reflected expanses of open landscape on terraces adjacent the Little Tennessee River.

Forest trees which are widespread throughout the Southern Forest zone and occur frequently as dominants or subdominants include oak (Quercus) and hickory (Carya). These trees include numerous species that occupy a diverse range of moisture and topographic gradients, displaying adaptation to a wide range of ecological conditions.

Pollen Cores

Two cores were collected from the St. Francis River and the St. Francis Sunken Lands in Poinsett County in northeastern Arkansas for the purpose of paleoenvironmental analysis (Table 19). While the area of the St. Francis River near Core 1 is currently used as a pecan orchard, the natural vegetation in this area is lowland hardwood forest along the river valleys. The upper fine-grained deposits appear to represent sediments of Holocene age, while the sandier deposits at a greater depth represent active channel sediments of the early Holocene or very late Pleistocene age (Dixon, personal communication, March 1987). The pollen samples that were analyzed from depths of 5 to 29 feet in this core represent clay and sandy clay deposits, which appear to qualify as belonging to the fine-grained deposits of Holocene age.

Core 1 from the St. Francis River has yielded a single radiocarbon age of 6,600 B.P. from a natural levee at a depth of 8

to 10 feet. This encompasses sample 1-2 on the pollen diagram, from a depth of 9 feet.

Core 2 was collected from the St. Francis Sunken Land fluvial deposits. This area, referred to as the sunken lands, is the result of river valley drowning. The vegetation is currently extensive hardwood forest. The sediments from which pollen was extracted varied from clay at 5 feet to sand at 23 feet.

The pollen record from Core 1 from the St. Francis River represents deposits that are apparently from a time period beginning after 12,000 B.P. and continuing until after 6,000 B.P. These bracket dates are determined by the absence of significant quantities of spruce and fir (*Picea* and *Abies*) pollen, which occur in other pollen records between 16,500 and 12,500 B.P. The pollen record from these sediments at a depth of 29 feet record an established hardwood forest along the banks of the St. Francis River. The ending date placed after 6,000 B.P. reflects the radiocarbon age returned for the natural levee between 8 and 10 feet in depth.

Table 19. Provenience of the Pollen Sample from the St. Francis River and the St. Francis Sunken Lands.

Core 1, St. Francis River

Sample No.	Depth Below Surface (Feet)	(cm)	Radiocarbon Age	Pollen Counted
1-1	5	152.40		200
1-2	9	274.32	6,660 ± 170 B.P.	200
1-3	15	457.20		200
1-4	21	640.08		200
1-5	26	792.48		200
1-6	29	883.92		100

Core 2, St. Francis Sunken Lands

Sample No.	Depth Below Surface (Feet)	(cm)	Radiocarbon Age	Pollen Counted
2-1	5	152.40		100
2-2	9	274.32		100
2-3	13	396.24		200
2-4	15	457.20		100
2-5	17	518.16		100
2-6	23	701.04	31,250 ± 840 B.P.	100

The basal portion of Core 1 from the St. Francis River is dominated by arboreal pollen from a depth of 29 to 21 feet (Figure 13). Quercus, Juniperus/Taxodium, Pinus, and Carya are the main sources of arboreal pollen at these depths. Quercus declines in frequency from 29 to 21 feet, while the Juniperus/Taxodium frequency remains relatively constant, and the Pinus pollen frequency increases. Carya pollen also decreases during this time period, but the Salix pollen remains relatively stable. Other members of the arboreal community during this interval include Alnus, Betulaceae, Juglans, Liquidambar, Nyssa, Tilia, and Ulmus. The nonarboreal components of the lower sediments include Caryophyllaceae; Cheno-ams; various composites including Artemesia, Low-spine, and High-spine; Cruciferae; Cyperaceae; Gramineae; Leguminosae; Liliaceae; Potamogeton; Sagittaria; Apocynum; and Saxifragaceae. Gramineae pollen increases gradually throughout the pollen record from the base to the top of the core. Cheno-am pollen also increases, although not gradually, as the major increases lie at the nine and five foot levels.

The upper portion of the pollen record from this core exhibits arboreal and nonarboreal pollen as co-dominants. The mixed forests appear to have decreased in density, specifically in the Quercus, Juniperus/Taxodium, and Carya frequencies. Other components of the arboreal community include Acer; Alnus; Betulaceae; Celtis; Juglans, which is noted as a regular component of the forest during the mid to late Holocene; Liquidambar; Nyssa; Picea; Salix; and Ulmus. The Cheno-am frequencies increased significantly in the nine and five foot levels of this portion of the pollen record, and the Gramineae pollen frequencies increased slightly. Other nonarboreal components of the vegetation community during the mid and late Holocene include Caryophyllaceae; Artemesia; and other Compositae including Low-spine, High-spine, and Liguliflorae; Cruciferae; Cyperaceae; Ephedra; Euphorbia; Labiatae; Leguminosae; Nyctaginaceae; Polemoniaceae; Potamogeton; Rosaceae; Saxifragaceae; Umbelliferae; and Isoetes.

The decline in arboreal pollen and increase in various nonarboreal pollen types suggests that prior to 6,600 B.P. the lowland hardwood forest found along the bottomlands of the river valleys thinned slightly, and the population of herbaceous plants increased. There is no evidence in the pollen record from the St. Francis River to indicate that serious paleoenvironmental shifts were displacing large segments of the vegetation. The vegetation along this river has been dominated by lowland hardwood forests since from the time represented at 29 feet until 5 feet below the surface. The consistency of the pollen record throughout these sediments suggests that the lowland hardwood forest was well established in this area prior to the middle Holocene, and has persisted until the present.

Core 2, removed from the St. Francis Sunken Lands, exhibits more variety in the pollen record than did Core 1 from the St. Francis River. The St. Francis Sunken Lands are apparently the

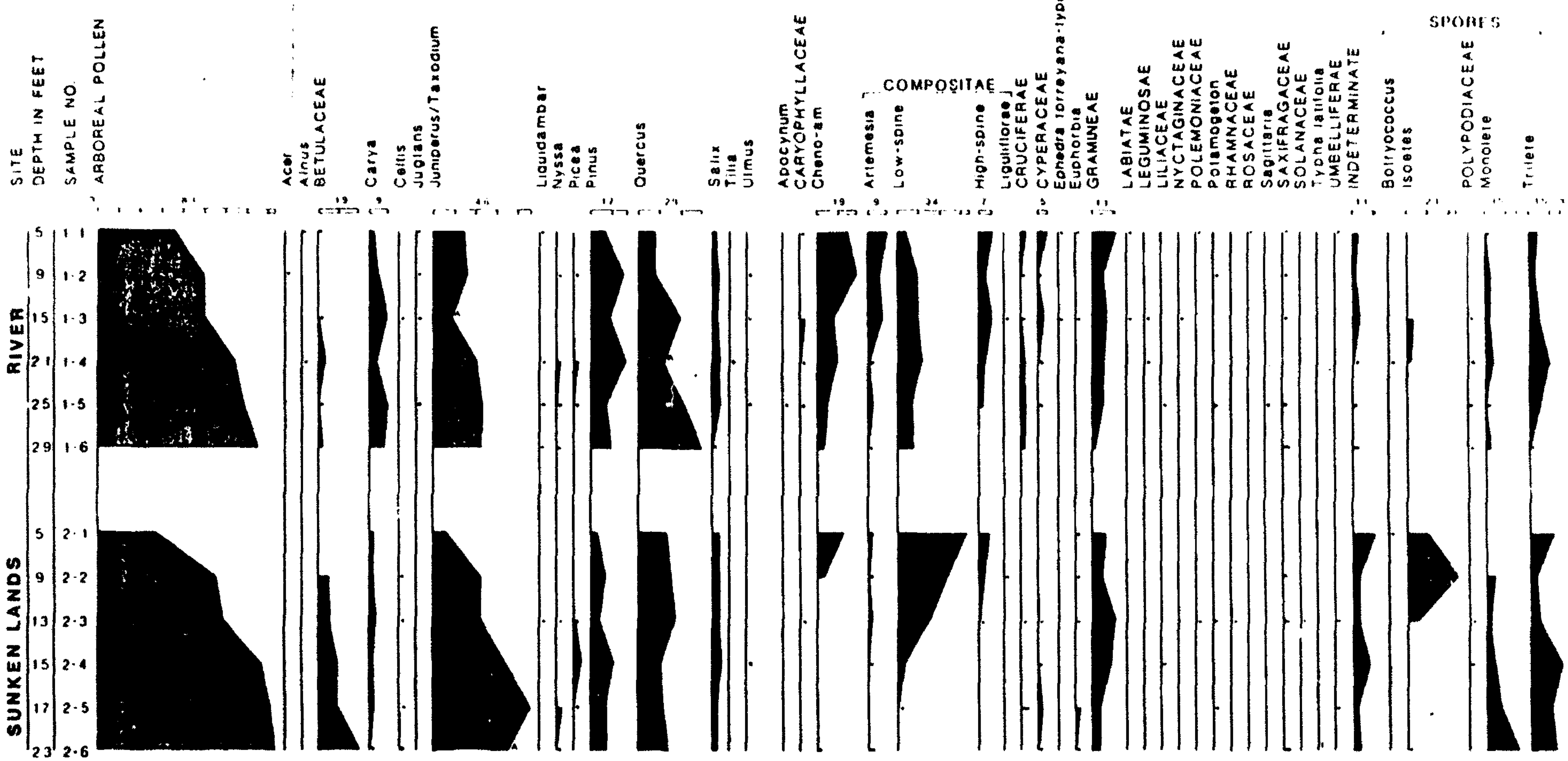


FIGURE 13. POLLEN DIAGRAM FROM CORES TAKEN ON THE ST. FRANCIS RIVER AND IN THE ST. FRANCIS SUNKEN LANDS

result of river valley drowning. The lower portion of this pollen diagram (23-15 feet) is clearly dominated by arboreal pollen, the most abundant of which is Juniperus/Taxodium. Betulaceae, Pinus, and Quercus also contribute moderately large frequencies to the pollen record. Carya and Salix contribute lesser frequencies, but are consistent in the pollen record. Other arboreal pollen types recovered include Juglans, Nyssa, Picea, and Ulmus. Pollen representing the understory includes Cheno-ams, Artemesia, Low-spine Compositae, Cruciferae, Cyperaceae, Euphorbia, Gramineae, Liliaceae, Polemoniaceae, Potamogeton, Saxifragaceae, Typha, and Umbelliferae. Numerous spores, including Polypodiaceae, monolete, and trilete spores representing ferns, are observed in these lower sediments. The pollen record suggests that the lower portion of this core represents a significantly drier forested situation in which juniper, birch, pine, and oak were major elements in a mixed forest.

The upper portion of the core in the St. Francis Sunken Lands is dominated by arboreal pollen in those samples from 13 and 9 feet, but is dominated by nonarboreal pollen in the uppermost sample collected at 5 feet (some portion of the upper 5 feet may be disturbed by dam construction). In this upper portion of the core the Juniperus/Taxodium pollen frequency has decreased from the lower portion, indicating a vast change in habitat. The Quercus, Carya, and Salix pollen remain virtually unchanged in the upper portion of this record. Declines are observed, however, in Betulaceae and Pinus pollen. A sharp increase in Isoetes microspores is noted in sample 2-2 at a depth of nine feet. The abundance of Isoetes microspores in samples from depths of 13, 9, and 5 feet indicate the presence of open water in the St. Francis Sunken Lands from this point in time on. It is interesting to note that this corresponds with a sharp increase in the frequency of Low-spine Compositae pollen at depths of 13, 9, and 5 feet. The growth of Low-spine Compositae may be associated with marshy margin deposits at this time. The Cheno-am frequencies also increase near the top of this record. The Juniperus/Taxodium portion of the arboreal environment, as well as Betulaceae, appear to be the most severely affected by the changing habitats caused by river valley drowning.

The relatively large quantity of Betulaceae pollen recorded at the base of the pollen record from the St. Francis Sunken Lands declines until a depth of nine feet, which is the last recorded instance of Betulaceae pollen from this core. The Betulaceae or Corylaceae family includes trees which thrive in varied habitats. Birches for instance are noted to grow primarily in rich woodlands. A few birches, however, inhabit bottomlands and the borders of streams as well as swampy areas (Fernald 1950). Nyssa, which is also noted from the lower portion of the pollen record, grows both in poorly drained alluvial flats and in more well drained soils of the mid and upper slopes. The presence of Salix within the pollen record is consistent from the base to the top of the core, indicating the presence of a riparian community. The presence of Pinus,

Quercus, and Carya pollen in approximately stable frequencies throughout this pollen record indicate the presence of bottomland mixed forests in the vicinity. Members of the Polypodiaceae, which probably include most of the monolete and trilete spores recorded in this report, also thrive in varied habitats which include rich open woods, bottomland forests, and swamps and bogs (Fernald 1950). It is primarily the near absence of Isoetes microspores in the lower portion of this pollen record, and their rapid increase by a depth of nine feet that indicate the lower portion of the pollen record at the St. Francis Sunken Lands represents a woodland habitat prior to river valley drowning. This woodland is characterized by the presence of juniper/cypress, birches, pine, and oak. The pollen record from the lower sediments examined from the St. Francis Sunken Lands do not display the characteristics of the pollen record between 16,000 and 12,500 B.P. elsewhere in the southeast. It appears, therefore, that no pollen samples were examined reflecting deposits of this time period, as a basal date of 31,250 B.P. was obtained from the core.

Summary and Conclusions

Pollen records generated through the analysis of two cores collected at the St. Francis River and St. Francis Sunken Lands in northeastern Arkansas provide evidence of the Holocene environment in this area. The vegetation recorded for the St. Francis River was dominated by a mixed forest in the river bottomlands. The forest appears to have declined slowly but steadily with its clear dominance at a depth of 29 feet, to a situation of co-dominance between 15 and 9 feet, to a subdominant position at 5 feet. The forested area along the St. Francis River appears to have been considerably denser in the past than it is today; although, the components appear to be similar to those of the recent past.

The pollen record at the St. Francis Sunken Lands indicates a dramatic change in the vegetation from the lower part of the pollen record (15-23 feet) to the upper portion of the record (5-13 feet). The lower portion of the record represents a heavily wooded river valley, where juniper/cypress were among the dominant trees. Birches, pine, and oak were also abundant in the bottomland forest. Hickory, hackberry, blackgum or tupulogum, Salix, and Ulmus also contributed to the forest vegetation. Relatively small quantities of spruce pollen were blown into the area during this time. An absence of Isoetes microspores from this portion of the pollen record indicates that this area had not yet suffered from river valley drowning.

The upper portion of the pollen record at the St. Francis Sunken Lands represents a change in vegetation due to river valley drowning, as is noted by the abrupt increase in Isoetes microspores between depths of 13 and 9 feet. The juniper and birch populations are reduced drastically in the vicinity of the St. Francis Sunken Lands during the upper portion of the core. The pine and oak populations appear to be less affected by this

environmental change. Low-spine Compositae and Cheno-am pollen increase dramatically in the upper portion of the record, indicating that these weedy herbaceous plants increased their population significantly following the drowning of this area.

Comparison with pollen records generated from Big Lake and Pemiscot Bayou (Scott and Aasen 1987) to the northeast of this study area provides some similarities. The large frequencies of Cheno-am and Low-spine Compositae pollen observed in the upper samples of the St. Francis Sunken Lands following river valley drowning are reminiscent of the pollen record from Pemiscot Bayou. The association of high quantities of Low-spine Compositae with relatively large frequencies of Isoetes microspores is noted at both Pemiscot Bayou and St. Francis Sunken Lands, suggesting an association of Low-spine Compositae with wet or marshy habitats. Increases in oak and pine pollen were recorded at both Big Lake and Pemiscot Bayou, although they were more obvious at Pemiscot Bayou, during the middle Holocene. These changes heralded drier conditions between 6,500 and 3,500 B.P. Increases in the Pinus and Quercus pollen are noted at the 21 foot and 15 foot levels of the Saint Francis River core, which predates the available radiocarbon age of 6,660 B.P. at a depth of 9 feet. Drier conditions were observed at Old Field in southeastern Missouri between 8,700 and 5,000 B.P., when the grassland expands at the expense of the bottomland community. Following the increase in pine and oak at the St. Francis River, these populations reduce as do most of the trees and grasses. Cheno-ams increase suggesting that this warming trend may continue at the St. Francis River through 6,600 B.P. until the top of the pollen record at a depth of 5 feet.

Paleoenvironmental interpretations gleaned from the pollen records at the St. Francis River and the St. Francis Sunken Lands indicate that the bottomland mixed forest, in evidence at depths of 5 feet in both locations were present throughout the length of the core studied in both locations. It is also noted that the density of these forests was considerably greater in the past than at present. In addition, the birch family was far more heavily represented at the St. Francis Sunken Lands prior to river valley drowning than it is at present. River valley drowning in the St. Francis Sunken Lands served to drastically reduce the forested area, and introduce swampy, herbaceous communities. A similar episode of inundations was recorded at Big Lake and Pemiscot Bayou between approximately 4,000 and post 3,000 B.P. (Scott and Aasen 1987). Vegetation patterns displayed in the pollen cores collected at the St. Francis River and the St. Francis Sunken Lands conform to general regional patterns recorded for the southeast; although, local variations in the pollen record were observed at these locations.

SIGNIFICANCE, RECOMMENDATIONS AND SUMMARY

The Phillips Site (3PO493)

The Phillips Site (3PO493) is a historic and multicomponent prehistoric site with all components restricted to the plowzone. Portions of the site, including the part nearest Ditch 1 and the southwestern edge, are eroded; and surface artifact densities were the highest in these areas due to soil deflation. Overall, the controlled collections verified a low density of prehistoric material on the surface of the site. The low density of prehistoric artifacts combined with the mixing of material from the Early Woodland, Late Woodland, and Mississippian periods indicates the site has little research potential for providing information important to our understanding of the prehistory of the area. The historic artifacts represent a late nineteenth and early twentieth century component. Due to the nature of sites of this period and a long history of plowing, subsurface features probably do not remain. It is doubtful that the site is related to an important person or event; and, for all of the stated reasons, the Phillips Site (3PO493) is not considered eligible for nomination to the National Register of Historic Places. No further archeological work is recommended at this site.

Site 2

Site 2 was a single sherd found in spoil used to construct an airstrip parallel to Ditch 1. The site fill was redeposited from two ditch spoil locations. Site 2 is not significant in terms of research potential and is not considered eligible for nomination to the National Register of Historic Places. No further work is recommended.

The Cooper Estate Site (3PO494)

The Cooper Estate Site (3PO494) was a thin scatter of ceramics on an eroding terrace. Subsurface tests indicated that no intact deposits remain at this site. The low density of undecorated sherds suggests limited occupations/utilization during the Woodland and Mississippian periods, not assignable to specific phases. Likewise, site function is not known. This site has little research potential and is not considered eligible for nomination to the National Register of Historic Places. No further work is recommended at the Cooper Estate Site (3PO494) in connection with the proposed project.

Site 4

Site 4 is an isolated sherd found during the survey. Since it was found outside the project area, no subsurface investigations were conducted and no determination of significance or evaluation of eligibility for nomination to the National Register of Historic Places has been made. The Ditch 1 project will not affect this site and no further work is necessary in connection with the proposed project.

The Ritter Pecan Grove Site (3PO495)

Description

The Ritter Pecan Grove Site (3PO495) is an intact, buried, Mississippian midden. Although subsurface tests indicated that the site is small, the organically rich midden, containing sherds, charcoal, and fired clay, suggests an intensive or repeated occupation of this site. It is likely that data pertinent to several contemporary research questions are preserved.

Significance

Two of the three radiocarbon dates from 3PO495 fall within the range A.D. 810-1150. The third date, A.D. 1360-1500, from a stratigraphically lower level than the other two dates, is probably anomalous. The A.D. 810-1150 range falls in the Early Mississippian time period, perhaps transitional to the Middle Mississippian; and research topics relative to these time periods may be addressed with information from 3PO495. Based on data presently available, the function of the site is best described as a single house site. This type of settlement is more common in the Middle Mississippian period; however, the lack of any other temporally distinct data makes this assignment tentative.

To date, the more detailed studies of the Mississippian period have focused on fairly large villages and ceremonial sites. The single house site has been predominatly recognized through surface surveys. However, the importance of these small sites should not be discounted. For instance, Smith (1978:499) states:

> These numerous, but poorly known, small sites that comprise the lower end of the Mississippian settlement systems represent, I think, one of the most promising avenues of research in terms of learning more concerning such systems. Expanded research on the lower end of Mississippian settlement systems should be focused initially on the interrelated problems of identifying the variety of functionally different site types that exist within different systems, and establishing the range of variation that is to be expected within each site category.

Smith (1978:500) further indicates that research topics could focus on the duration of the settlement, the spatial patterns at the site, the activities present, and the size and composition of the group. The farm homestead should have its own set of characteristics which differentiates it from other types of temporary occupations or utilization.

Major research themes which have been outlined in the State Plan (Morse 1982b) fall under the category of cultural change and continuity as related to technology, subsistence, settlement, social organization, ideology, human biology, and gemorphology. Technological topics which may be addressed at 3PO495 include defining: the cultural material assemblage; raw material sources; the relationship between storage pits and household size; the construction, shape, and size of activity areas and features related to a single household; the ceramic technologies, including the uselife of vessels; and more specific questions about the cultural material found at the site, including the presence and frequency of specific artifacts. The apparent lack of lithic artifacts is also an unusual phenomenon in need of further investigation.

Due to the presence of carbonized floral remains and burned and unburned fauna within the deposit, 3PO495 contains information relative to subsistence. Areas of research might include determining: the role of cultigens in the diet, which natural resources were selected as part of the diet, and whether salt manufacture was a localized household activity.

The settlement patterns of the period or periods represented at 3PO495 were no doubt tied to the geomorphology of the landscape. The criteria for site selection should be more fully understood after additional research. Site function, the seasons of occupation, and intersite settlement patterns are all topics which could be addressed. The location of The Ritter Pecan Grove Site (3PO495) in close proximity to several large well known mound sites provides a setting for the study of the kinds of social, political, and ceremonial ties that existed between local populations and ceremonial centers.

The activities other than those fulfilling the basic needs of food and shelter often reflect aspects concerning the social organization and ideology of the group living at the site. Also, symbols often depicted on ceramics, pipes, etc., are indications of the belief system. These items may be present at 3PO495.

Continued research into the geomorphology of the landscape could help in the reconstruction of the environment at the time of occupation, including the availability of raw materials and food sources. The fact that the deposits are buried supports the hypothesis that similar sites may be buried in alluvial settings, especially on natural levee deposits. Understanding when and why the sediments buried this landform should lead to understanding natural processes so that predictions concerning where other sites are likely to be buried can be made. The relationship of

the site to either the active channel or oxbow lake may become apparent during further investigation. It has been hypothesized that the establishment of Middle Mississippian sites on oxbows "represented expansion into newly-formed, unexploited niche areas" (Phillips, Ford, and Griffin 1951:300; Smith 1975:167, 1978). There is some difficulty testing which environmental setting (oxbow or river meander) was present, because the fauna and flora in each econiche are similar. Further studies at 3PO495 may result in new information which would resolve this difficulty.

As with other areas of the state, high priorities for research are placed on stratified and buried deposits. Also, sites which contain tightly controlled strata which can be dated through radiocarbon and/or other means are almost always considered significant. 3PO495 may contain data on the emergence of Mississippian culture, a research problem which continues to pervade the southeast (Smith 1978:481).

Due to the fact that 3PO495 is likely to yield information important to our understanding of the prehistory of the region, (Criterion D), it is SPEARS opinion that 3PO495 is significant and eligible for nomination to the National Register of Historic Places.

Recommendations

Preservation is recommended for The Ritter Pecan Grove Site (3PO495). It is currently relatively protected in a well established pecan grove which has a dense ground cover of bermuda grass. However, even if the site is avoided by the proposed project, the parcel of land containing the site may come under the jurisdiction of the Corps of Engineers as fee land or easement. In that case, the following recommendations, which should be incorporated in the site management plan developed for 3PO495, are made: (1) Further test the site in order to collect sufficient information to nominate the site to the National Register of Historic Places, (2) Set a permanent brass datum on or near the site so that its location can be easily established should further investigations become necessary in the future, (3) Maintain an adequate vegetation cover such as bermuda grass to prevent erosion of the terrace, and (4) Prevent significant root damage by disallowing the planting of additional pecan trees.

As stated, 3PO495 is presently located at the edge of a prominent terrace about 40 meters from Ditch 1. Due to this distance, it may be possible that the proposed Ditch 1 modifications could easily be restricted to the low lands below the site. However, if it is not feasible to protect or avoid the site, then any destructive activities which would adversely alter its present condition should be mitigated. Mitigation measures in this instance would consist of the excavation of large control blocks using state of the art techniques. By exposing large areas, features such as post molds and pits should become evident. These need to be documented in great detail.

Recovery techniques should include the collection of samples for radiocarbon and other dating techniques, floral and faunal specimens, and other detailed specialized analyses.

Summary of Geomorphic Examination and Pollen Analysis

The oldest landform identified in this study was the braided stream terrace observed in Core 2 located in the St. Francis Sunken Lands. One charcoal sample collected from within the braided terrace dated these deposits to 31,250 ± 840 B.P. The pollen record represents a heavily wooded river valley, where juniper/cypress was among the dominant trees. Above the braided terrace in the St. Francis Sunken lands are channel fill deposits which reflect a change in vegetation due to valley drowning.

In Core 1 the oldest deposits recognized were crevasse channel deposits. The pollen record in these sediments indicated an extremely dense hardwood forest was established in this river region. Natural levee sediments were found above the crevasse channel deposits. The upper portion of this levee has produced a date of 6,660 ± 170 years B.P. By this time the lowland forest had thinned considerably. Above the levee is a clay plug or oxbow which developed under slackwater conditions. These sediments are associated with the youngest landform identified in the vicinity of the project.

The results of the pollen study were compared to other studies in the region. The vegetational patterns displayed in the pollen cores conform to the general regional patterns recorded for the region; however, local variations are observed. A Hypsithermal period is suggested in the pollen record at an earlier date than recognized from samples analyzed from Big Lake and from southeastern Missouri.

Results of the geomorphic examination indicate that there is a potential for buried archeological sites in a variety of depositional environments in the project vicinity. Some of these environments may not occur in the corridor surveyed by SPEARS. Archeological sites may occur on relict braided stream terraces and on natural levees associated with meandering streams. Wherever these landforms are buried by recent backswamp or channel fill sediments, archeological sites may be buried also.

Braided stream terraces have been mapped by Saucier (1970, 1974) on both sides of the chutes of the Little River including the Ditch 1 area. However, they have been identified in the present investigations only west of the St. Francis River, and have not been identified in recent studies east of the Right Hand Chute of Little River (Guccione 1987). If Saucier's mapping is correct, the braided stream terrace may be buried by recent backswamp deposits in the Ditch 1 area, and archeological sites on the surface of the terrace would also be buried.

In the present study, braided stream sediments were identified in Core 2 at the western edge of the St. Francis Sunken Lands, but not in Core 1 on the east side of the modern St. Francis River. It is likely, therefore, that the braided stream sediments east of the sunken lands have been removed by more recent meanders of the Mississippi River, and that the coarser grained sediments identified in Core 1 are crevasse channel deposits and natural levee sediments of the Mississippi River in its meandering regime. These coarser sediments were overlain in Core 1 by fine grained sediments identified as a clay plug in an abandoned channel. Elsewhere in the project area the natural levee sediments are probably overlain by recent backswamp deposits of the Left Hand Chute of Little River.

The episodic deposition of sediments which created the natural levees is the process responsible for burying many archeological sites. The natural levees, which are now mostly buried beneath backswamp sediments, are the most likely locations for deeply buried and stratified sites. Ditch 1 traverses several old meanders along which natural levees are probably buried. Obvious among these are Horseshoe Lake, Swan Lake, and Spear Lake. Others are probably present but have been masked entirely by backswamp sediments.

It should be noted that during SPEARS survey of approximately 17 linear miles along Ditch 1, subsurface examinations were conducted along 2.5 miles. The remainder of the area had good surface visibility and pedestrian transects were conducted. Soils in these areas appeared to be primarily backswamp deposits with a low potential for archeological sites. Shovel tests were not required in these areas. With the data collected during the present study, it now appears that there is a possibility that archeological sites are buried beneath those backswamp sediments. Some may be so deeply buried that shovel tests would not discover them.

Of the sites discovered during the present survey, the Phillips Site (3PO493) and the Cooper Estate Site (3PO494) are located on an eroded terrace edge that is not buried by recent sediments. These sites were recognized by a scatter of artifacts on the surface. The Ritter Pecan Grove Site (3PO495), however, is located on a buried natural levee. This site was not visible on the surface, and was detected in a shovel test. It is likely that other buried sites remain undetected and difficult to find with current archeological field methodologies.

Based on the radiocarbon date of 6,660 $\pm$ 170 B.P. obtained from natural levee sediments in Core 1, sites up to that age and perhaps older could be buried in the vicinity of the project area. A systematic program of deep coring at small intervals would be required to map and date these buried geomorphic features and identify specifically the locations which have a high potential for buried archeological sites. If the existing Ditch 1 channel had bisected one of these deeply buried sites, cultural material would have been observed on the ditch spoil.

However, no artifacts were observed or collected from the Ditch 1 spoil. Likewise, shovel testing will not find the deeply buried sites.

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APPENDIX A:

LITHIC ANALYSIS FORM
DITCH 1

STATE SITE NO._____ PAGE_____ of_____
SITE_____ ACC. NO._____ PROVENIENCE_____

LITHICS	CRC	S#	BU	S#	OT	S#	O	S#	SS	LM	O	S#	Sub-T	#TA
A._____														
W_____														
M_____														
PP/K TIPS														
PP/K MIDSECT														
PP/K BASE (Unid)														
UTILIZED BIFACE														
PREFORM														
HAMMERSTONE														
EDGE GR. COBBLE														
PITTED COBBLE														
SANDSTONE ABRADER														
POLISHED STONE														
STEEP UNIFACE														
SPOKESHAVE														
DRILL														
MICRO-DRILL														
UTIL BLADE/FLAKE														
OTHER TOOL														
	CRC	S#	BU	S#	OT	S#	O	S#	SS	LM	O	S#	SUB-T	#TA
CORES AND FRAGS														
MICRO-CORES														
TESTED COBBLE														
PRIMARY DECORT.														
SECOND. DECORT.														
INTERIOR FLAKE														
PREFORM THINNING														
BIFACE THINNING														
TRUE BLADE														
MICRO-BLADE														
PRESS. FLAKE/ABM														
OTHER														
SUB TOTAL														
FCR														
UNMOD COBBLE														
UNMOD STONE														
UNMOD ANG. FRAG.														
TOTALS														

APPENDIX B:

DITCH 1 CERAMIC ANALYSIS

TEMP. SITE NO. _____ STATE SITE NO._____

ACCESSION NO._____ PROVENIENCE_____

		PLAIN	DECORATED	TOTAL
SHELL				
	RIM	CT____ FSN____	CT____FSN____	_____
	BASE	CT____ FSN____	CT____FSN____	_____
	BODY	CT____ FSN____	CT____FSN____	_____
	TOTAL	____	____	_____
		PLAIN	CORDMARKED	
SAND				
	RIM	CT____ FSN____	CT____FSN____	_____
	BASE	CT____ FSN____	CT____FSN____	_____
	BODY	CT____ FSN____	CT____FSN____	_____
	TOTAL	____	____	_____
		PLAIN	CORDMARKED	
GROG				
	RIM	CT____ FSN____	CT____FSN____	_____
	BASE	CT____ FSN____	CT____FSN____	_____
	BODY	CT____ FSN____	CT____FSN____	_____
	TOTAL	____	____	_____
		PLAIN	DECORATED_____	
OTHER_____				
	RIM	CT____ FSN____	CT____FSN____	_____
	BASE	CT____ FSN____	CT____FSN____	_____
	BODY	CT____ FSN____	CT____FSN____	_____
	TOTAL	____	____	_____
GRAND TOTAL		____	____	_____

OTHER CERAMICS_____

FIRED CLAY (COUNT) W/SAND_____ W/OUTSAND_____OTHER_____TOTAL____

RECONSTRUCTABLE VESSELS _____ UNSORTED PARTICLES_____

APPENDIX C:

DITCH 1

HISTORIC ARTIFACTS

TEMPORARY SITE NO._____ STATE SITE NO._____

Accession No._____ FSN_____Provenience _____

SUB NO.	COUNT	ARTIFACT DESCRIPTION
---	_____	round nails
---	_____	square nails
---	_____	misc. metal
---	_____	other _____
---	_____	clear glass, window
---	_____	green glass, window
---	_____	clear glass, other_____
---	_____	green glass, other_____
---	_____	brown glass
---	_____	blue glass
---	_____	purple glass
---	_____	milk glass
---	_____	pressed glass
---	_____	glass, other _____
---	_____	glass, other _____
---	_____	whiteware
---	_____	transferware_____
---	_____	transferware_____
---	_____	crockery_____
---	_____	stoneware_____
---	_____	churn fragment_____
---	_____	porcelin
---	_____	handpainted_____
---	_____	other_____
---	_____	other_____
---	_____	other_____
---	_____	other_____
---	_____	marbles, glass
---	_____	marbles, ceramic
---	_____	electrical insulators, glass
---	_____	electrical insulators, porcelin
---	_____	other_____
---	_____	other_____
---	_____	other_____
TOTAL	_____	

APPENDIX D: Artifact Definitions, Ditch 1

Lithic Definitions

Descriptions of the lithic categories and raw material types are partly derived from several sources including The Cache River Archeological Project (Schiffer and House 1975), and Village Creek (Klinger et al. 1985). Abbreviations used on the analysis sheet are presented in parentheses after the category name.

PROJECTILE POINT/KNIFE FRAGMENTS (PP/K): These are portions of bifaces other than preforms. These fragments are usually not diagnostic of a particular cultural stage, but may be indicative of a general use (if serrated, or otherwise flaked/resharpened in a diagnostic way). A type name if known or a general description was written in the blank for whole pp/k's thought to be Archaic (A), Woodland (W) or Mississippian (M). Fragments were counted under the appropriate portion (tip, midsection, or base).

UTILIZED BIFACE: These are artifacts which have been modified on two faces to form a working edge, with retouch, polish, or other evidence of use. They lack hafting elements and some are late stage preforms. They are unidentifiable as to specific cultural-historical type.

PREFORM: These are bifacially flaked and usually symmetrical in outline, but lack secondary pressure flaking and evidence of hafting. They also lack use retouch or wear. Some show obvious obstacles to further thinning or shaping and are interpreted to be aborted preforms.

HAMMERSTONE: These are cobbles that show battering or abrasion on convex edges. Usually, the heavier the battering, the more nearly spherical the cobble will be. Fragments of cobbles that show the edge battering or characteristic interior fractures along multiple cones of force are counted in this category.

EDGE GROUND (GR.) COBBLE: These are generally flat cobbles with abraded or lightly pecked edges, lacking the heavier battering of hammerstones.

PITTED COBBLE: These are cobbles, usually sandstone, having two opposite faces nearly flattened by weathering. On either or both of the nearly flat faces are one or more pits. These pits may be either "V"-shaped or "U"-shaped in cross section and are generally shallower than their maximum diameter.

SANDSTONE ABRADER: These are irregular pieces of sandstone, usually coarse-grained, having one or more grooves with "V"-shaped or "U"-shaped cross sections which were apparently produced by abrading and sharpening bone tools.

POLISHED STONE: This is any stone with an intentionally polished surface. Artifacts with use polish on or near a working edge are not counted in this class.

STEEP UNIFACES: These are unifacially worked flakes with at least one steeply retouched edge. They would presumably have functioned as scrapers.

SPOKESHAVE: These are unifacially worked flakes with at least one concavity along a prepared edge.

DRILL: These are bifaces, probably reworked projectile points, with the blade portion reduced to a nearly cylindrical or steeply diamond-shaped cross section. They presumably functioned as drills.

MICRO-DRILL: These are micro-blades having a thick cross section and secondary retouch near the distal tip, indicating use as perforators or drills.

UTILIZED BLADE/FLAKE (UTIL BLADE/FLAKE): These are flakes or blades which show use retouch or prepared working edges. They lack flaking on the reverse face other than use retouch and, in some cases, removal of the bulb of percussion by a single secondary flake. Flakes from proveniences such as the surface and plowzone are not counted as utilized unless the secondary retouch is extensive or otherwise determined to be intentional.

OTHER TOOL: Any lithic tool which does not conform to one of the more specific definitions presented above is entered in this class. For the Ditch 1 project, this includes adzes and adz fragments particularly.

CORES AND CORE FRAGMENTS (CORES AND FRAGS): These are cobbles with at least three flakes removed, usually more. Most have two prepared platforms for removal of flakes and those used more extensively are completely decorticate (except perhaps on a striking platform) and have the appearance of truncated polyhedrals. Identifiable fragments, including large "rejuvenation" flakes retaining much of the striking platform, are counted in this category.

MICRO-CORES: These are small, polyhedral cores that may be nearly cylindrical. They are often of exotic chert, especially Burlington-like chert. Blades have usually been removed from both ends of the more cylindrical cores, and some may have been removed by using a "bipolar technique".

TESTED COBBLE: These are cobbles of a sufficient size to serve as cores, usually patinated cherts, which have one or two flakes removed, as if they were being tested for chippable qualities.

FLAKES OF PRIMARY DECORTICATION (PRIMARY DECORT.): These are flakes of any size but often large which retain cortex on 90% or more of their obverse surface. The percentage of cortex present was visually estimated, not precisely measured.

FLAKES OF SECONDARY DECORTICATION (SECOND. DECORT.): These are flakes of any size which retain cortex on less than 90% of their obverse (dorsal) surface. Flakes with cortex only on the portion of the striking platform retained at the proximal end are not counted in this category, but are counted as interior flakes.

INTERIOR FLAKES: These are flakes with no cortex, or with cortex only on the striking platform, that do not have the characteristics of true blades, preform or biface thinning flakes, or pressure flakes. Interior flakes usually have a nearly right angle striking platform, or at least the striking platform is not acute and shows no bifacial flaking. This is an "other flake" category, and flakes without striking platforms or bulbs of percussion (flake fragments) are counted here. Flakes which show thermal alteration such as irregular fractures or potlids are also counted here if there is evidence that the flakes were produced by percussion before they were burned.

PREFORM THINNING FLAKES: These are flakes with an acute striking platform, bifacial flaking on both faces of the proximal edge, and the "lip" characteristic of soft hammer percussion. The bifacial flaking consists of broad flake scars, not apparently produced by pressure flaking and showing no use wear.

BIFACE THINNING FLAKES: These are flakes similar to preform thinning flakes which differ in the nature of the bifacial flake scars. At least some of the dorsal flake scars originating at the proximal edge must be the narrow, shallow scars characteristic of pressure flaking or must be the steep, short scars resulting from use. Questionable bifacial thinning flakes are counted as Preform Thinning.

TRUE BLADE: These are flakes which are at least twice as long as their maximum width. In addition they must show at least two flake scars on their obverse surface indicating the prior removal of similar long flakes. They may be either triangular or trapezoidal in transverse section. They differ from "Interior Flakes" only in their greater length-width ratio.

MICRO-BLADE: These are blades that have been struck from micro-cores. They may be thin or triangular in cross section, but thick, triangular or trapezoidal blades were apparently sought for use as micro-drills and perforators.

PRESSURE FLAKES/ABRASION MATERIAL (PRESS FLAKE/ABM): These are the small, thin flakes produced by application of the flaking tool to a restricted area on a thin, usually bifacial, edge. The flake expands from a narrow point of origin and usually follows a ridge produced by two earlier flake scars on its dorsal surface. There is no pronounced bulb of percussion. Very small, thin, flake fragments which were probably produced by abrading an edge prior to pressure flaking are also counted in this category.

OTHER: Any lithic specimen which does not readily fit a more specific definition is assigned to this class.

FIRE CRACKED ROCK (FCR): These are fragments of stone of any kind which show evidence of thermal alteration, especially irregular breaks, but also including fragments with potlids and color changes and those which do not fit a more descriptive category. FCR includes some potlidded flakes on which no compression rings and no bulbs of percussion are visible. Because of thermal alteration, sorting by raw materials was difficult and no attempt was made to sort artifacts into specific chert types other than Crowley's Ridge Chert when cortex was retained or color change was minor. All fire cracked rock identified was either "Crowley's Ridge Chert", "sandstone", "orthoquartzite", or "other chert".

UNMODIFIED COBBLE (UNMOD COBBLE): These are stream cobbles, with cortex, of any material from which no flakes have been removed and which do not show abrasion, polishing, pitting, or other evidence of intentional shaping.

UNMODIFIED STONE (UNMOD STONE): These are pebbles that show no intentional modification of any kind. They differ from "unmodified cobbles" only in size. They are smaller than 5 cm in diameter. Because of their weathered surface and small size they were generally not sorted by raw material and were usually coded on the analysis form as Crowley's Ridge chert.

UNMODIFIED ANGULAR FRAGMENTS (UNMOD ANG. FRAG.): These are angular fragments of any lithic material which show no intentional shaping or use. They are mostly fragments with irregular breaks but no obvious indications of thermal alteration. They are comparable to "shatter flakes" or "chunks" in some typologies.

Lithic Raw Materials

The following are descriptions of the classes of raw materials used in the analysis of the lithics from the prehistoric site in the Ditch 1 Project. These are not formal descriptions. They are based on macroscopically observed characteristics only, and are intended as a guide for the preliminary sorting appropriate to a survey and initial testing phase analysis and for planning research designs that may

incorporate lithic resource studies. The abbreviations used on the Ditch 1 Analysis Form follow the class name.

Crowley's Ridge Chert (CRC): The chert or gravel from Crowley's Ridge is quite variable in color but is typically brown, tan, yellowish tan, gray, gray tan, or cream colored. Red colors are less common and could be a result of thermal alteration. The cortex, which is usually smooth, is often darker and may be brown, reddish brown, or grayish brown. Interiors are sometimes mottled, but less commonly banded (House 1975:82).

Burlington-like Chert (BU): All white or whitish cherts collected during the Ditch 1 fieldwork were classified as Burlington-like chert. Most of the whitish chert was mottled with gray or yellow. These colors are consistent with cherts derived from the Burlington limestone in southern Illinois and adjacent areas in Missouri (Myers 1970; Rick 1978; McElrath 1986). This includes cherts previously classified as Dupo (Morse 1971) and Crescent Quarry (Morse 1976; Sierzchula 1980).

Orthoquartzite (OT): This stone is whitish with clear, rounded quartz sand grains in a translucent whitish matrix. The stone is well cemented with the siliceous matrix and fractures through the quartz sand grains. Known outcrops of this material are located on Crowley's Ridge about 20 km northwest of the Ditch 1 project.

Other Cherts (O): These include all other cherts not typically characteristic of those described above. Because of the difficulty in sorting thermally altered materials, most of the chert in the fire cracked rock class was counted as "other chert" although it is probably from Crowley's Ridge gravels.

Sandstone (SS): Sandstone is composed of quartz sand grains of any size embedded in a silicate or other matrix which is softer than the quartz grains so that the stone breaks around the sand grains. Exterior colors are usually brown or reddish brown.

Limestone (LM): Some well rounded pebbles of limestone were collected. These are interpreted to be crushed agricultural limestone applied historically to increase the pH of the acidic clays in the project area.

Other Stone (O): Any lithic material not readily identifiable as chert, orthoquartzite, sandstone, or limestone is included in this class.

Ceramic Definitions

SHELL TEMPERED: All sherds in this class are plain and eroded. The shell has leached out and the sherds do not react with dilute hydrochloric acid. They are identified by the presence of shallow pits on the surface and thin, plate-like holes in cross section of the core. These pits and holes represent shell fragments of a size (2-3 mm) consistent with the type

Mississippi Plain. Surface color is predominantly gray, with some tending to buff; and the core color differs little from the surface.

SAND TEMPERED: These sherds are identified by their sandy feel, the absence of visible inclusions of clay particles, and the absence of the thin, plate-like holes and pits which would indicate leached shell tempering. Surface and interior colors are predominantly buff. All sherds in this class are body sherds.

CLAY (GROG) TEMPERED: These sherds have visible inclusions of clay particles in the paste. They lack the plate-like pits and holes characteristic of leached shell. Some grit, especially crushed hematite, is visible in the paste but may be accidental inclusions.

SHELL AND SAND TEMPERED: Sherds in this class differ from the preceding class of shell tempered sherds in having a coarse, gritty feel and having visible inclusions of sand grains in the paste. None of the sherds in this class were as thin as the thinnest shell tempered sherds, but all were within the range of the shell tempered class.

SHELL AND CLAY TEMPERED: Sherds in this class differ from the class of shell tempered sherds in that they have visible inclusions of clay particles along with the leached platelets in the paste. They are within the range of thickness of the shell tempered class although none are as thin as the thinnest shell tempered sherds.

SAND AND GROG TEMPERED: These sherds have the sandy feel of sand tempered sherds, but also have visible inclusions of clay particles. They lack the leached pits of the shell tempered classes. They are the thickest class of sherds in the sample.

APPENDIX E: Project Personnel, Ditch 1

Carol S. Spears served as Co-Director for this Project. Spears has been involved in southeastern archeology for almost 15 years. She received her M.A. degree in anthropology with specializations in southeastern prehistory and cultural resource management from the University of Arkansas. Since that time she has participated in projects in Arkansas, Missouri, Illinois, North Carolina and Yugoslavia. From 1977-1980, she was an archeologist for the State of North Carolina and directed both their public education and National Register programs. From 1980-1985, she worked as a consultant for several private and state agencies and directed numerous projects around the state. In January 1986, she established her own firm, Spears Professional Environmental and Archeological Research Service (SPEARS) which provides quality archeological research for a reasonable cost to federal, state, and private firms in Arkansas.

Robert A. Taylor served as Co-Director for this Project. Taylor has over ten years experience in Arkansas and received his M.A. from the University of Arkansas. He has worked at a wide variety of sites throughout the state, including the Zebree Site in Mississippi County and the Frierson and Floodway Sites in Poinsett County. He has also directed projects for the Arkansas Archeological Survey and Texas A & M University Research Foundation. He has special interests in the Caddoan Indians, the philosophy of science, and archeological theory. Taylor's contributions to our knowledge of prehistory in Arkansas include a study concerning the survey for buried Paleo-Indian sites in northeast Arkansas and a report on excavations at the Cryer Site, a Caddoan manifestation. He has been a Field Director and a major author on projects with SPEARS.

Dr. John C. Dixon is a geomorphologist, soils specialist, and faculty member of the Department of Geography at the University of Arkansas. He received his Ph.D. from the University of Colorado at Boulder and his M.A. from the University of Adelaide, South Australia. He has held numerous teaching posts and has received several academic awards and honors. Dr. Dixon has published in a number of areas related to geomorphology and soils, especially weathering processes. His research interest in paleoenvironments and soil formation has led to several working and teaching associations with Arkansas archeologists and graduate students in anthropology seeking expertise in geomorphology.

Linda Scott Cummings has completed coursework for a Ph.D. and has an M.A. degree in Anthropology with emphasis on archeological palynology from the University of Colorado. She is author of numerous pollen studies around the country including recent research in the Mississippi Valley. Cummings is Director of the Palynological Analysts, an Archaeobiological Laboratory in Lakewood, Colorado.

Phyllis A. Morse was the project historican. She completed her graduate coursework for a Ph.D. in Anthropology at the University of Michigan. Since that time she has resided in northeast Arkansas and conducted research on the history of the area. She has authored and co-authored several major reports, manuscripts and books.

Michael G. Million served as Field Supervisor on this project. He has over eight years experience in Arkansas Archeology and has completed his coursework for a M.A. degree in Anthropology at the University of Arkansas. From the early 1970's to late 1980's he was employed as a lab assistant and research assistant for the Arkansas Archeological Survey. During that time he participated in many excavations at sites such as Nodena, Sloan, and Zebree. He has special interests in ceramics and has performed numerous pottery replication experiments.

SECTION C - DESCRIPTION/SPECIFICATIONS (SCOPE OF WORK)

Archeological Intensive Survey of the Ditch 1, Arkansas, Item 1, St. Francis Basin Project, Poinsett County, Arkansas.

C-1. GENERAL.

C-1.1. The Contractor shall conduct a background and literature search, an intensive survey investigation, a geomorphic study, and initial site testing along Ditch 1 in Poinsett County, Arkansas. Reports of these investigations shall be submitted. These tasks are in partial fulfillment of the Memphis District's obligations under the National Historic Preservation Act of 1966 (P.L. 89-665), as amended; the National Environment Policy Act of 1969 (P.L. 91-190); Executive Order 11593, "Protection and Enhancement of Cultural Environment," 13 May 1971 (36 CFR Part 800); Preservation of Historic and Archeological Data, 1974 (P.L. 93-291), as amended; and the Advisory Council on Historic Preservation, "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800).

C-1.2. Personnel Standards.

a. The Contractor shall utilize a systematic, interdisciplinary approach to conduct the study. Specialized knowledge and skills will be used during the course of the study to include expertise in archeology, history, architecture, geology and other disciplines as required to fulfill requirements of this Scope of Work. Techniques and methodologies used for the study shall be representative of the state of current professional knowledge and development.

b. The following minimal experiential and academic standards shall apply to personnel involved in investigations described in this Scope of Work:

(1) Archeological Project Directors or Principal Investigator(s) (PI). Individuals in charge of an archeological project or research investigation contract, in addition to meeting the appropriate standards for archeologist, must have a publication record that demonstrates extensive experience in successful field project formulation, execution and technical monograph reporting. It is mandatory that at least one individual acting as Principal Investigator or Project Director under this contract have demonstrated competence and ongoing interest in comparable cultural resources or archeological research in the Northeast Arkansas Region. Extensive prior research experience as Principal Investigator or Project Director in immediately adjacent areas will also satisfy this requirement. The requirement may also be satisfied by utilizing consulting Co-principal Investigators averaging no less than 24 paid hours per month for the duration of contract activities. Changes in any Project Director or Principal Investigator must be approved by the Contracting Officer. The Contracting Officer may require suitable professional references to obtain estimates regarding the adequacy of prior work.

(2) Archeologist. The minimum formal qualifications for individuals practicing archeology as a profession are a B.A. or B.S. degree from an accredited college or university, followed by a minimum of two years of

successful graduate study or equivalent with concentration in anthropology and specialization in archeology and at least two summer field schools or their equivalent under the supervision of archeologists of recognized competence. A Master's thesis or its equivalent in research and publication is highly recommended, as is the M.A. degree.

(3) Architectural Historian. The minimum professional qualifications in architectural history are a graduate degree in architectural history, historic preservation, or closely related fields, with course work in American architectural history; or a bachelor's degree in architectural history, historic preservation, or closely related field plus one of the following:

(a) At least two years full-time experience in research, writing, or teaching in American history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or

(b) Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

(4) Other Professional Personnel. All other personnel utilized for their special knowledge and expertise must have a B.A. or B.S. degree from an accredited college or university, followed by a minimum of two years of successful graduate study with concentration in appropriate study and a publication record demonstrating competing in the field of study.

(5) Other Supervisory Personnel. Persons in any supervisory position must hold a B.A., B.S. or M.A. degree with a concentration in the appropriate field of study and a minimum of 2 years of field and laboratory experience in tasks similar to those to be performed under this contract.

(6) Crew Members and Lab Workers. All crew members and lab workers must have prior experience compatible with the tasks to be performed under this contract. An academic background in the appropriate field of study is highly recommended.

c. All operations shall be conducted under the supervision of qualified professionals in the discipline appropriate to the data that is to be discovered, described or analyzed. Vitae of personnel involved in project activities may be required by the Contracting Officer at anytime during the period of service of this contract.

C-1.3. The Contractor shall designate in writing the name or names of the Principal Investigator(s). Participation time of the Principal Investigator(s) shall average a minimum of 50 hours per month during the period of service of this contract. In the event of controversy or court challenge, the Principal Investigator shall be available to testify with respect to report findings. The additional services and expenses would be at Government expense, per paragraph 1.8 below.

C-1.4. The Contractor shall keep standard field records which may be reviewed by the Contracting Officer. These records shall include field

notes, appropriate state site survey forms and any other cultural resource forms and/or records, field maps and photographs necessary to successfully implement requirements of this Scope of Work.

C-1.5. To conduct the field investigation, the Contractor will obtain all necessary permits, licenses; and approvals from all local, state and Federal authorities. Should it become necessary in the performance of the work and services of the Contractor to secure the right of ingress and egress to perform any of the work required herein on properties not owned or controlled by the Government, the Contractor shall secure the consent of the owner, his representative, or agent, prior to effecting entry on such property.

C-1.6. Innovative approaches to data location, collection, description and analysis, consistent with other provisions of this contract and the cultural resources requirements of the Memphis District, are encouraged.

C-1.7. No mechanical power equipment other than that referenced in paragraph C-4.5 shall be utilized in any cultural resource activity without specific written permission of the Contracting Officer.

C-1.8. The Contractor shall furnish expert personnel to attend conferences and furnish testimony in any judicial proceedings involving the archeological and historical study, evaluation, analysis and report. When required, arrangements for these services and payment therefor will be made by representatives of either the Corps of Engineers or the Department of Justice.

C-1.9. The Contractor, prior to the acceptance of the final report, shall not release any sketch, photograph, report or other material of any nature obtained or prepared under this contract without specific written approval of the Contracting Officer.

C-1.10. The extent and character of the work to be accomplished by the Contractor shall be subject to the general supervision, direction, control and approval of the Contracting Officer. The Contracting Officer may have a representative of the Government present during any or all phases of Scope of Work requirements.

C-1.11. The Contractor shall obtain Corps of Engineers Safety Manual (EM 385 -1-1) and comply with all appropriate provisions. Particular attention is directed to safety requirements relating to the deep excavation of soils.

C-1.12. There will be two categories of meetings between Contractor and Contracting Officer: (1) scheduled formal conferences to review contract performance, and (2) informal, unscheduled meetings for clarification, assistance, coordination and discussion. The initial meeting shall be held prior to the beginning of field work. Category (1) meetings will be scheduled by the Contracting Officer and will be held at the most convenient location, to be chosen by the Contracting Officer. This may sometimes be on the project site, but generally will be at the office of the Contracting Officer.

C-2. STUDY AREA.

C-2.1. The location of proposed channel construction for the Ditch 1, AR, Item 1 project is located near Marked Tree, Poinsett County, Arkansas. The work will begin at the junction of Ditch 1 and the St. Francis River and extend upstream about 8.44 miles to 200 feet upstream of the Highway 135 crossing. The survey area wil extend 200 feet, on both sides of the ditch, from the channel centerline. See attached map.

C-3. DEFINITIONS. See attached Amendment NO. 0001

C-3.1. "Cultural resources" are defined to include any building, site, district, structure, object, data, or other material relating to the history, architecture, archeology, or culture of an area.

C-3.2. "Background and Literature Search" is defined as a comprehensive examination of existing literature and records for the purpose of inferring the potential presence and character of cultural resources in the study area. The examination may also serve as collateral information to field data in evaluating the eligibility of cultural resources for inclusion in the National Register of Historic Places or in ameliorating losses of significant data in such resources.

C-3.3. "Intensive Survey" is defined as a comprehensive, systematic, and detailed on-the-ground survey of an area, of sufficient intensity to determine the number, types, extent and distribution of cultural resources present and their relationship to project features.

C-3.4. "Mitigation" is defined as the amelioration of losses of significant prehistoric, historic, or architectural resources which will be accomplished through preplanned actions to avoid, preserve, protect, or minimize adverse effect upon such resources or to recover a representative sample of the data they contain by implementation of scientific research and other professional techniques and procedures. Mitigation of losses of cultural resources includes, but is not limited to, such measures as: (1) recovery and preservation of an adequate sample of archeological data to allow for analysis and published interpretation of the cultural and environmental conditions prevailing at the time(s) the area was utilized by man; (2) recording, through architectural quality photographs and/or measured drawings of buildings, structures, districts, sites and objects and deposition of such documentation in the Library of Congress as a part of the National Architectural and Engineering Record; (3) relocation of buildings, structures and objects; (4) modification of plans or authorized projects to provide for preservation of resources in place; (5) reduction or elimination of impacts by engineering solutions to avoid mechanical effects of wave wash, scour, sedimentation and related processes and the effects of saturation.

C-3.5. "Reconnaissance" is defined as an on-the-ground examination of selected portions of the study area, and related analysis adequate to assess the general nature of resources in the overall study area and the probable impact on resources of alternate plans under consideration. Normally reconnaissance will involve the intensive examination of not more than 15 percent of the total proposed impact area.

C-3.6. "Significance" is attributable to those cultural resources of historical, architectural, or archeological value when such properties are included in or have been determined by the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places after evaluation against the criteria contained in 36 CFR 63.

C-3.7. "Testing" is defined as the systematic removal of the scientific, prehistoric, historic, and/or archeological data that provide an archeological or architectural property with its research or data value. Testing may include controlled surface survey, shovel testing, profiling, and limited subsurface test excavations of the properties to be affected for purposes of research planning, the development of specific plans for research activities, excavation, preparation of notes and records, and other forms of physical removal of data and the material analysis of such data and material, preparation of reports on such data and material and dissemination of reports and other products of the research. Subsurface testing shall not proceed to the level of mitigation.

C-3.8. "Analysis" is the systematic examination of material data, environmental data, ethnographic data, written records, or other data which may be prerequisite to adequately evaluating those qualities which contribute to their significance.

C-4. GENERAL PERFORMANCE SPECIFICATIONS.

C-4.1. Research Design.

Survey and testing will be conducted within the framework of a regional research design including, where appropriate, questions discussed in the State Plan. All typological units not generated in these investigation, shall be adequately referenced. It should be noted that artifactual typologies constructed for other areas may or may not be suitable for use in the study area. It is, therefore, of great importance that considerable effort be spent in recording and describing artifactual characteristics treated as diagnostic in this study as well as explicit reasons for assigning (or not assigning) specific artifacts to various classificatory units.

C-4.2. Background and Literature Search.

a. This task shall include an examination of the historic and prehistoric environmental setting and cultural background of the study area and shall be of sufficient magnitude to achieve a detailed understanding of the overall cultural and environmental context of the study area. It is axiomatic that the background and literature search shall normally preceed the initiation of all fieldwork.

b. Information and data for the literature search shall be obtained, as appropriate, from the following sources: (1) Scholarly reports - books, journals, theses, dissertations and unpublished papers; (2) Official Records - Federal, state, county and local levels, property deeds, public works and other regulatory department records and maps; (3) Libraries and Museums - both regional and local libraries, historical societies, universities, and museums; (4) Other repositories - such as private collections, papers,

photographs, etc.; (5) Archeological site files at local universities, the State Historic Preservation Office, the office of the State Archeologist; (6) Consultation with qualified professionals familiar with the cultural resources in the area, as well as consultation with professionals in associated areas such as history, sedimentology, geomorphology, agronomy, and ethnology.

c. The Contractor shall include as an appendix to the draft and final reports, written evidence of all consultation and any subsequent responses(s), including the dates of such consultation and communications.

d. The background and literature search shall be performed in such a manner as to facilitate the construction of predictive statements (to be included in the study report) concerning the probable quantity, character, and distribution of cultural resources within the project area. In addition, information obtained in the background and literature search should be of such scope and detail as to serve as an adequate data base for subsequent field work and analysis in the study area undertaken for the purpose of discerning the character, distribution and significance of specific identified cultural resources.

e. In order to accomplish the objectives described in paragraph C-4.2.d., it will be necessary to attempt to establish a relationship between landforms and the patterns of their utilization by successive groups of human inhabitants. This task should involve defining and describing various zones of the study area with specific reference to such variables as past topography, potential food resources, soils, geology, and river channel history.

C-4.3. Intensive Survey.

a. Intensive survey shall include the on-the-ground examination of the study areas described in paragraph C-2.

b. Unless excellent ground visability and other conditions conducive to the observation of cultural evidence occurs, shovel test pits, or comparable subsurface excavation units, shall be installed at intervals no greater than 30 meters throughout the study area. Note that auger samples, probes, and coring tools will not be considered comparable subsurface units. Shovel test pits shall be minimally 30 x 30 centimeters in size and extend to a minimum depth of 50 centimeters. Unit fill material shall be screened using 1/4" mesh hardware cloth. Additional shovel test pits shall be excavated in areas judged by the Principal Investigator to display a high potential for the presence of cultural resources. If, during the course of intensive survey activities, areas are encountered in which disturbance or other factors clearly and decisively preclude the possible presence of significant cultural resources, the Contractor shall carefully examine and document the nature and extent of the factors and then proceed with survey activities in the remainder of the study area. Documentation and justification of such action shall appear in the survey report. The location of all shovel test units and surface observations shall be recorded.

c. When cultural remains are encountered, horizontal site boundaries shall be derived by the use of surface observation procedures (including controlled surface collection procedures described in Paragraph C-4.4.a. below) in such a manner as to allow precise location of site boundaries on Government project drawings and 7.5 minute U.S.G.S. quad maps when available. Methods used to establish site boundaries shall be discussed in the survey report together with the probable accuracy of the boundaries. The Contractor shall establish a datum at the discovered cultural loci which shall be precisely related to the site boundaries as well as to a permanent reference point (in terms of azimuth and distance) by means of a transit level. If possible, the permanent reference point used shall appear on Government blueline (project) drawings and/or 7.5 minute U.S.G.S. quad maps. If no permanent landmark is available, a permanent datum shall be established in a secure location for use as a reference point. The permanent datum shall be precisely plotted and shown on U.S.G.S. quad maps and project drawings. All descriptions of site location shall refer to the location of the primary site datum.

d. All standing buildings and structures (other than those patently modern, i.e., less than 50 years old) shall be recorded and described. For a building to be considered "standing" it must retain four walls and at least a skeletal roof structure. A building or structure found in the field to be partially or totally collapsed will be considered an archeological site. In these cases, data concerning construction materials and techniques and floor plan, if discernible, must be collected. The Contractor shall supply preliminary information concerning the suitability of a structure or building for relocation and restoration (structural soundness for example).

C-4.4. Testing Activities.

a. Initial Site Testing.

(1) Surface collection of the site area shall be accomplished in order to obtain data representative of total site surface content. Both historic and prehistoric items shall be collected. The Contractor shall carefully note and record descriptions of surface conditions of the site including ground cover and the suitability of soil surfaces for detecting cultural items (ex: recent rainfall, standing water or mud). If ground surfaces are not highly conducive to surface collection, screened shovel tests units shall be used to augment surface collection procedures. It should be noted, however, that such units should be substituted for total surface collection only where the presence of ground cover requires such techniques.

(2) Care should be taken to avoid bias in collecting certain classes of data or artifact types to the exclusion of others (ex: debitage or faunal remains) so as to insure that collections accurately reflect both the full range and the relative proportions of data classes present (ex: the proportion of debitage to finished implements or types of implements to each other). Such a collecting strategy shall require the total collection of quadrat or other sample units in sufficient quantities to reasonably assure that sample data are representative of such descrete site subareas as may exist. Since the number and placement of such sample units will depend, in part, on the subjective evaluation of intrasite variability, and the amount

of ground cover, the Contractor shall describe the rationale for the number and distribution of collection units. In the event that the Contractor utilizes systematic sampling procedures in obtaining representative surface samples, care should be taken to avoid periodicity in recovered data. No individual sample unit type used in surface data collection shall exceed 36 square meters in area. Unless a smaller fraction is approved by the Contracting Officer, surface collected areas shall constitute no less than 25 percent of total site areas. Detailed results of controlled surface collections shall be graphically depicted in plan view in the report of investigations.

(3) The Contractor shall undertake (in addition and subsequent to sample surface collecting) a general site collection in order to increase the sample size of certain classes of data which the Principal Investigator may deem prerequisite to an adequate site-specific and intersite evaluation of data.

(4) As an alternative to surface collecting procedures discussed above, where surface visability is excellent, the Contractor may collect all visable artifacts. If such a procedure is undertaken, the precise proveniences of all individual artifacts shall be related to the primary site datum by means of a transit level.

(5) Unless it can be conclusively demonstrated that no significant subsurface cultural resources occur at a site, the Contractor shall install in each appropriate site a minimum of one 1 X 1 meter subsurface test unit to determine the general nature of subsurface deposits.

(6) Subsurface test units (other than shovel cut units) shall be excavated in levels no greater than 10 centimeters. Where cultural zonation or plow disturbance is present however, excavated materials shall be removed by zones (and in 10 cm. levels within zones where possible). Subsurface test units shall extend to a depth of at least 20 centimeters below artifact bearing soils. A portion of each test unit, measured from one corner (of a minimum 30 X 30 centimeters), shall be excavated to a depth of 40 centimeters below artifact bearing soils. All excavated material (including plow zone material) shall be screened using a minimum of 1/4" hardware cloth. Representative profile drawings shall be made of excavated unit. Subsequent to preparation of profile drawings for each test unit, the unit snall be backfilled and compacted to provide reasonable pedestrian safety.

(7) Stringent horizontal spatial control of testing shall be maintained by relating the location of <u>all</u> collection and test units to the primary site datum either by means of a grid system (including those used in controlled surface collection) or by azimuth and distance.

(8) Other types of subsurface units may, at the Contractor's option, be utilized <u>in addition to</u> those units required by this Scope of Work.

(9) <u>Cultural Resource Recording and Numbering</u>. For each archeological site or architectural property recorded during the survey, the Contractor shall complete and submit the standard Arkansas archeological site or architectural property survey form, respectively. The Contractor shall be

responsible for reproducing or obtaining a sufficient quantity of thes to meet the needs of the project. The Contractor shall be responsi coordinating with the appropriate state agency to obtain state si numbers for each archeological site and architectural property recorde

b. Additional Investigations.

(1) Additional subsurface test units maybe required at many The proposed number and distribution of such test units shall be reco by the Principal Investigator on a site specific basis. This recomme shall be made based on such variables as site size and potential in variability, including, physiographic and geomorphic characteristics loci which may suggest variability in the presence or distribut subsurface cultural deposits. The Contractor shall detail the ratio for the placement and numbers of proposed test units in the man summary and report of field activities. Additional reporting requir examination of background literature and examination of standing bu and structures may also be required at some sites. The exact na additional examination, the schedule, and the price of the work s negotiated with the Contracting Officer, and if an agreement is rea Change Order shall be issued prior to conduct of the work. Add investigations will provide a data base of sufficient nature to determination of site eligibility to the National Register of Historic consistent with C-5.3.j.12) and (3) of this Scope of Work.

(2) In order to accurately relate a site to research domains assess significance or insignificance), a variety of data ga techniques may be required to insure recovery of the various types which may be present at the site. These techniques may include radi dating, flotation and excavation of cultural features. When appro these types of data gathering activities should be integral elements testing strategy.

C-4.5. Geomorphological Study.

The Contractor shall undertake geomorphic examinations of th area in order to determine the probability of the presence of sign subsurface cultural resources and the likely location and nature o resources. The study shall focus on data relating to the age and na of soil deposits in the study area and the implications of tho regarding the probable presence, location, age and nature of sign cultural resources associated with these soils.

(1) The Contractor shall obtain sufficient field samples attri to various temporal horizons to insure statistically reliable data minimum of two (2) palynological columns collected in such a manne allow taxa to be interpreted in paleoecological and paleoclimatic Biostratigraphic chronological data shall be established by me geomorphic and radiocarbon analysis. Obtaining suitable samples allo definition of continuous paleoenvironmental sequences during th temporal range of human occupation of the study area shall be consideration in the selection of sampling locations. Analysis of c data shall be undertaken to supply a data base for the determinatio

potential types and significance of buried cultural resource area.

(2) The Contractor shall utilize hand excavation, p and power coring equipment, as appropriate, to insure adeq penetration of soils in the collection of data required for al purposed described in paragraph C-4.5 of this Scope of Work.

(3) Investigations shall not include soils which are k possible human occupation. All sampling areas shall be such a applicable to study areas.

(4) Investigations shall include carefully reasoned recommendation and conclusions concerning:

a. the potential of the study area to contain bur cultural resources.

b. specific areas likely to contain significant cu and those unlikely to contain such deposits.

c. the likely nature of buried cultural deposit: area.

d. the need or lack of need for deep archeological study area.

e. if appropriate, a sampling plan for deep archeo including the numbers, type and location of proposed deep

(5) Although limited geological field observations an be necessary to obtain data, it is not anticipated that exten testing will be required. If additional deep archeological te necessary by the Contractor, the number, placement, tec requirements and cost to the Government of such testing shall with the Contracting Officer, and if an agreement is reached, shall be issued prior to the conduct of the work.

C-4.6. Laboratory Processing, Analysis, and Preservation.

All cultural materials recovered will be cleaned a deterioration resistant containers suitable for long t Diagnostic artifacts will be labeled and catalogued indi diagnostic artifact is defined herein as any object whi individually to the needs of analysis required by this Scope research design. All other artifacts recovered must minimall labeled, deterioration resistant containers, and the items ca Contractor shall describe and analyze all cultural material: accordance with current professional standards. Art non-artifactual analysis shall be of an adequate level and nat the requirements of this Scope of Work. All recovered cultur be catalogued in a manner consistent with Arkansas state requ Contractor shall consult with appropriate state officials as so

following the conclusion of field work in order to obtain information (ex: accession numbers) prerequisite to such cataloging procedures.

C-4.7. Curation.

Efforts to insure the permanent curation of properly cataloged cultural resources materials and project documentation in an appropriate institution shall be considered an integral part of the requirements of this Scope of Work. The Contractor shall pay all cost of the preparation and permanent curation of records and artifacts. An arrangement for curation shall be confirmed by the Contractor, subject to the approval of the Contracting Officer, prior to the acceptance of the final report.

C-5. GENERAL REPORT REQUIREMENTS.

C-5.1. The primary purpose of the cultural resources report is to serve as a planning tool which aids the Government in meeting its obligations to preserve and protect our cultural heritage. The report will be in the form of a comprehensive, scholarly document that not only fulfills mandated legal requirements but also serves as a scientific reference for future cultural resources studies. As such, the report's content must be not only descriptive but also analytic in nature.

C-5.2. Upon completion of all field investigation and research, the Contractor shall prepare a report detailing the work accomplished, the results, and recommendations for each project area. Copies of the draft and final reports of investigation shall be submitted in a form suitable for publication and be prepared in a format reflecting contemporary organizational and illustrative standards for current professional archeological journals. The final report shall be typed on standard size 8-1/2" x 11" bond paper with pages numbered and with page margins one inch at top, bottom, and sides. Photographs, plans, maps, drawings and text shall be clean and clear.

C-5.3. The report shall include, but not necessarily be limited to, the following sections and items:

a. Title Page. The title page should provide the following information; the type of task undertaken, the study areas and cultural resources which were assessed; the location (county and state), the date of the report; the contract number; the name of the author(s) and/or the Principal Investigator; and the agency for which the report is being prepared. If a report has been authored by someone other than the Principal Investigator, the Principal Investigator must at least prepare a foreword describing the overall research context of the report, the significance of the work, and any other related background circumstances relating to the manner in which the work was undertaken.

b. Abstract. an abstract suitable for publication in an abstract journal shall be prepared and shall consist of a brief, quotable summary useful for informing the technically-oriented professional public of what the author considers to be the contributions of the investigation to knowledge.

c. Table of Contents.

d. Introduction. This section shall include the purpose of the report, a description of the proposed project, a map of the general area, a project map, and the dates during which the investigations were conducted. The introduction shall also contain the name of the institution where recovered materials and documents will be curated.

e. Environmental Context. This section shall contain, but not be limited to, a discussion of probable past floral, faunal, and climatic characteristics of the project area. Since data in this section may be used in the evaluation of specific cultural resource significance, it is imperative that the quantity and quality of environmental data be sufficient to allow subsequent detailed analysis of the relationship between past cultural activities and environmental variables.

f. Previous Research. This section shall describe previous research which may be useful in deriving or interpreting relevant background data, problem domains, or research questions and in providing a context in which to examine the probability of occurrence and significance of cultural resources in the study area.

g. Literature Search and Personal Interviews. This section shall discuss the results of the literature search, including specific data sources, and personal interviews which were conducted during the course of investigations.

i. Survey, Testing and Analytical Methods. This section shall contain an explicit discussion of the research design, and shall demonstrate how environmental data, previous research data, the literature search and personal interviews have been utilized in constructing the strategy. Specific research domains and questions as well as methodological strategies employed to address those questions should be included where possible.

j. Recommendations.

(1) This section should contain, where possible, assessments of the eligibility of specific cultural properties in the study area for inclusion in the National Register of Historic Places.

(2) Significance should be discussed explicitly in terms of previous regional and local research and relevant problem domains. Statements concerning significance shall contain a detailed, well-reasoned argument for the property's research potential in contributing to the understanding of cultural patterns, processes or activities important to the history or prehistory of the locality, region or nation, or other criteria of significance. Conclusions concerning insignificance likewise, shall be fully documented and contain detailed and well-reasoned arguments as to why the property fails to display adequate research potential or other characteristics adequate to meet National Register criteria of significance. For example, conclusions concerning significance or insignificance relating solely to the lack of contextual integrity due to plow disturbance or the lack of subsurface deposits will be considered inadequate. Where appropriate, due consideration

should be given to the data potential of such variables as site functional characteristics, horizontal intersite or intrasite spatial patterning of data and the importance of the site as a representative systemic element in the patterning of human behavior. All report conclusions and recommendations shall be logically and explicitly derived from data discussed in the report.

(3) The significance or insignificance of cultural resources can be determined adequately only within the context of the most recent available local and regional data base. Consequently the evaluation of specific individual cultural loci examined during the course of contract activities shall relate these resources not only to previously known cultural data but also to a synthesized interrelated corpus of data including those data generated in the present study.

(4) Where appropriate, the Contractor shall provide alternative mitigation measures for significant resources which will be adversely impacted. Data will be provided to support the need for mitigation and the relative merits of each mitigation design will be discussed. Preservation of significant cultural resources is nearly always considered preferable to recovery of data through excavation. When a significant site can be preserved for an amount reasonably comparable to, or less than the amount required to recover the data, full consideration shall be given to this course of action.

k. References (American Antiquity Style).

l. Appendices (Maps, Correspondence, etc.). A copy of this Scope of Work and, when stipulated by the Contracting Officer, review comments shall be included as appendices to the final report of investigations.

C-5.4. The above items do not necessarily have to be discrete sections; however, they should be readily discernible to the reader.

C-5.5. In order to prevent potential damage to cultural resources, no information shall appear in the body of the report which would reveal precise resource location. All maps which indicate or imply precise site locations shall be included in reports as a readily removable appendix (e.g. envelope).

C-5.6. No logo or other such organizational designation shall appear in any part of the report (including tables or figures) other than the title page.

C-5.7. Unless specifically otherwise authorized by the Contracting Officer, all reports shall utilize permanent site numbers assigned by the state in which the study occurs.

C-5.8. All appropriate information (including typologies and other classificatory units) not generated in these contract activities shall be suitably referenced.

C-5.9. Reports shall contain site specific maps. Site maps shall indicate site datum(s), location of data collection units (including shovel cuts, subsurface test units and surface collection units), site boundaries in

relation to proposed project activities, site grid systems (where appropriate), and such other items as the Contractor may deem appropriate to the purposes of this contract.

C-5.10. Information shall be presented in textual, tabular, and graphic forms, whichever are most appropriate, effective and advantageous to communicate necessary information. All tables, figures and maps appearing in the report shall be of publishable quality.

C-5.11. Any abbreviated phrases used in the text shall be spelled out when the phrase first occurs in the text. For example use "State Historic Preservation Officer (SHPO)" in the initial reference and thereafter "SHPO" may be used.

C-5.12. The first time the common name of a biological species is used it should be followed by the scientific name.

C-5.13. In addition to street addresses or property names, sites shall be located on the Universal Transverse Mercator (UTM) grid.

C-5.14. Generally, all measurements should be metric.

C-5.15. As appropriate, diagnostic and/or unique artifacts, cultural resources or their contexts shall be shown by drawings or photographs.

C-5.16. Black and white photographs are preferred except when color changes are important for understanding the data being presented. No instant type photographs may be used.

C-5.17. Negatives of all black and white photographs and/or color slides of all plates included in the final report shall be submitted to the Contracting Officer.

C-6. SUBMITTALS.

C-6.1. An extensive management summary shall be submitted, in accordance with the schedule in paragraph C-7.1, to the Contracting Officer within 14 days of the completion of survey and initial testing. The management summary shall describe survey and initial testing methods and the data yielded by those methods. Where survey data, initial testing data and other sources of data are adequate, the Contractor shall evaluate cultural resources identified during survey activities in terms of eligibility for inclusion in the National Register of Historic Places. The evaluation shall be consistent with requirements in paragraph C-5.3.j. of this Scope of Work. Where inadequate data exist for such an evaluation, the Contractor shall recommend specific additional studies, as described in paragraph C-4.4.b. of this Scope of Work, necessary to obtain adequate data for such National Register evaluation. The management summary shall include project maps showing boundaries of discovered cultural resources relative to project rights-of-way. The management summary shall also contain recommendations, based on geomorphic and other data, concerning the need for deep cultural resources testing and the type, numbers and locations of needed deep test units.

C-6.2. The Contractor shall submit 4 copies of the draft report and one original and 25 copies with high quality binding, of the final report which include appropriate revisions in response to the Contracting Officer's comments.

C-6.3. The Contractor shall submit under separate cover 6 copies of appropriate 15' quadrangle maps (7.5' when available) or other site drawings which show exact boundaries of all cultural resources within the project area and their relationship to project features.

C-6.4. The Contractor shall submit to the Contracting Officer completed National Register forms including photographs, maps, and drawings in accordance with the National Register Program, if any sites inventoried during the survey are found to meet the criteria of eligibility for nomination and for determination of significance. The completed National Register forms shall be submitted with the final report.

C-6.5. At any time during the period of service of this contract, upon the written request of the Contracting Officer, the Contractor shall submit, within 15 calendar days, any portion or all field records described in paragraph C-1.4 without additional cost to the Government.

C-6.6. When cultural resources are located during intensive survey activities, the Contractor shall supply the appropriate State Historic Preservation Office with completed site forms, survey report summary sheets, maps or other forms as appropriate. Blank forms may be obtained from the State Historic Preservation Office. Copies of such completed forms and maps shall be submitted to the Contracting Officer within 30 calendar days of the end of fieldwork.

C-6-7. The Contractor shall prepare and submit with the final report, a site card for each identified resource or aggregate resource. These site cards do not replace state approved prehistoric, historic, or architectural forms or Contractor designed forms. These 5 X 8 inch cards shall be color-coded. White cards shall be used for prehistoric sites, blue cards for historic sites, green for architectural sites and yellow cards for potentially significant sites. Sites fitting two or more categories will have two or more appropriate cards. This site card shall contain the following information, to the degree permitted by the type of study authorized:

a. Site number

b. Site name

c. Location: section, township, and UTM coordinates (for procedures in determining UTM coordinates, refer to How to Complete National Register Forms, National Register Program, Volume 2.

d. County and state

e. Quad maps

f. Date of record

g. Description of site

h. condition of site

i. Test excavation results

j. Typical artifacts

k. Chronological position (if known)

l. Relation to project

m. Previous studies and present contract number

n. Additional remarks

C-6.8. Documentation. The Contractor shall submit detailed monthly progress reports to the Contracting Officer by the 7th day of every month for the duration of the contract. These reports will contain an accurate account of all field work, laboratory procedures and results in sufficient detail to allow monitoring of project progress.

C-7. SCHEDULE.

C-7.1. The Contractor shall, unless delayed due to causes beyond his control and without his fault or negligence, complete all work and services under this contract within the following time limitations.

Activity	Completion Time (In calendar days beginning with acknowledged date of receipt of notice to proceed)
Survey/Initial Testing Fieldwork	8
Submittal Management Summary	40
Submittal of Draft Report of Investigations	72
Submittal of Final Report of Investigations	159

C-7.2. The Contractor shall make any required corrections after review by the Contracting Officer. The Contracting Officer may defer Government review comments pending receipt of review comments from the State Historic Preservation Officer or other reviewing agencies. More than one series of draft report corrections may be required. In the event that the government review period is exceeded and upon request of the Contractor, the contract period will be extended automatically on a calendar day for day basis. Such extension shall be granted at no additional cost to the Government.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 | 1

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
0001	86 JUN 02		

6. ISSUED BY CODE W38XGR

Department of the Army
Memphis District, Corps of Engineers
B-202 Clifford Davis Federal Building
Memphis, Tennessee 38103-1894

7. ADMINISTERED BY (If other than Item 6) CODE

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

(X) 9A. AMENDMENT OF SOLICITATION NO.

DACW66-86-R-0054

9B. DATED (SEE ITEM 11)

86 MAY 13

10A. MODIFICATION OF CONTRACT/ORDER NO.

10B. DATED (SEE ITEM 13)

CODE FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers [ ] is extended, [X] is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [ ] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

*This solicitation is for Cultural Resources Survey and Geomorphic Examination of the Ditch 1, Arkansas, Item 1, St. Francis Basin Project, Poinsett County, AR

Section C- Description/Specifications (Scope of Work)

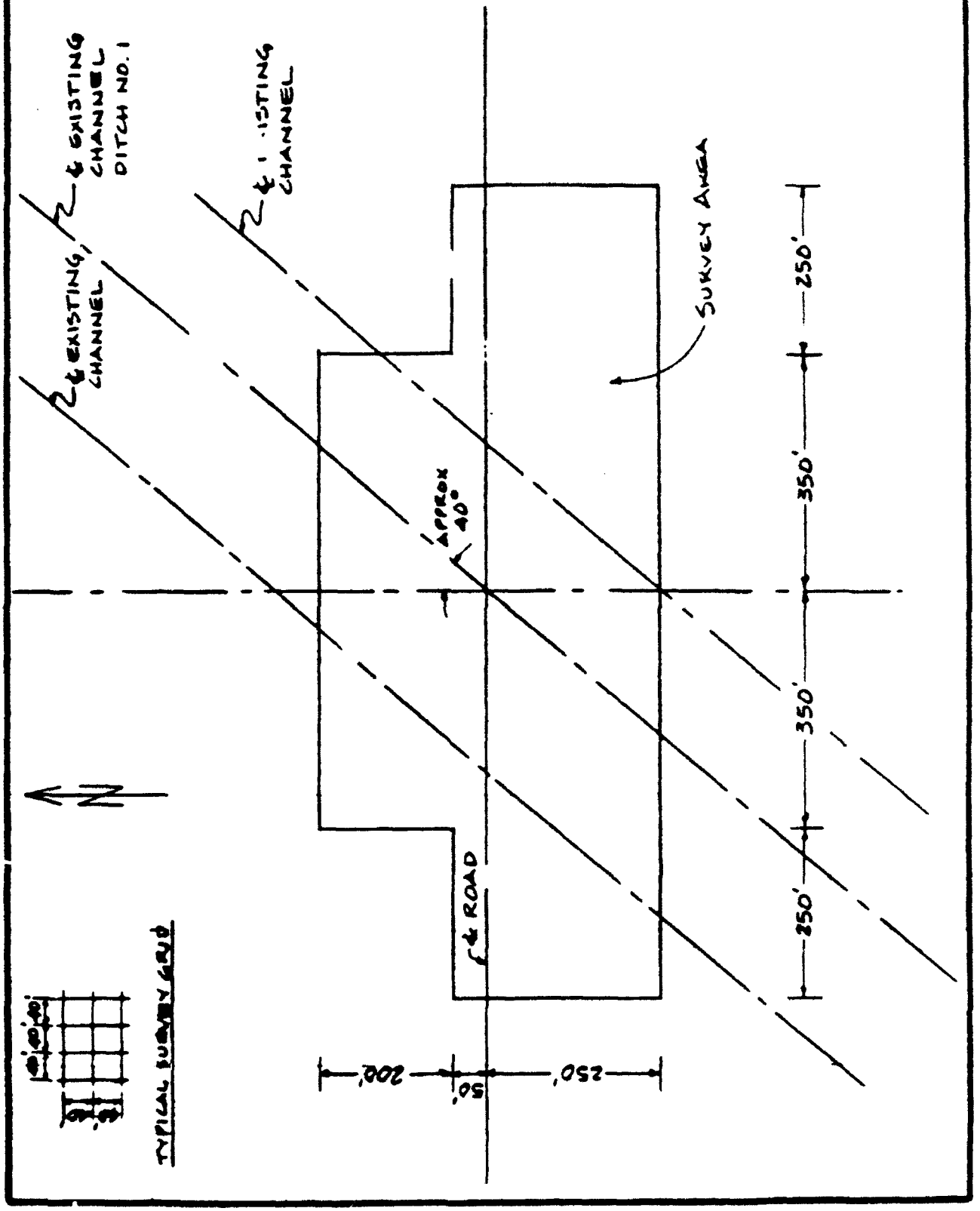
Page 4, paragraph C-2.1. At the end of the paragraph add "The existing bridge at river mile 4.04 requires survey of more than the 200 feet right-of-way. The attached drawing shows the correct survey area for the bridge."

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED

COMPUTATION SHEET

PROJECT	PAGE	COMPUTED BY	DATE
DITCH NO. 1 ARK. ITEM 1	1 OF 1	GTL	2/20/85
SUBJECT: DETAILED SURVEY & BRIDGE SITE FAC. P1 MILE 4.04		CHECKED BY	DATE



LMV FORM 1 FEB 70 1078 PREVIOUS EDITIONS MAY BE USED

AMENDMENT NO. 0001